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Four-Spindle Screw Machines for Large Work

An Evolution in the Development of National Acme Tools for Rapid Production from Bars Up to 3 In. and 4 In. in Diameter

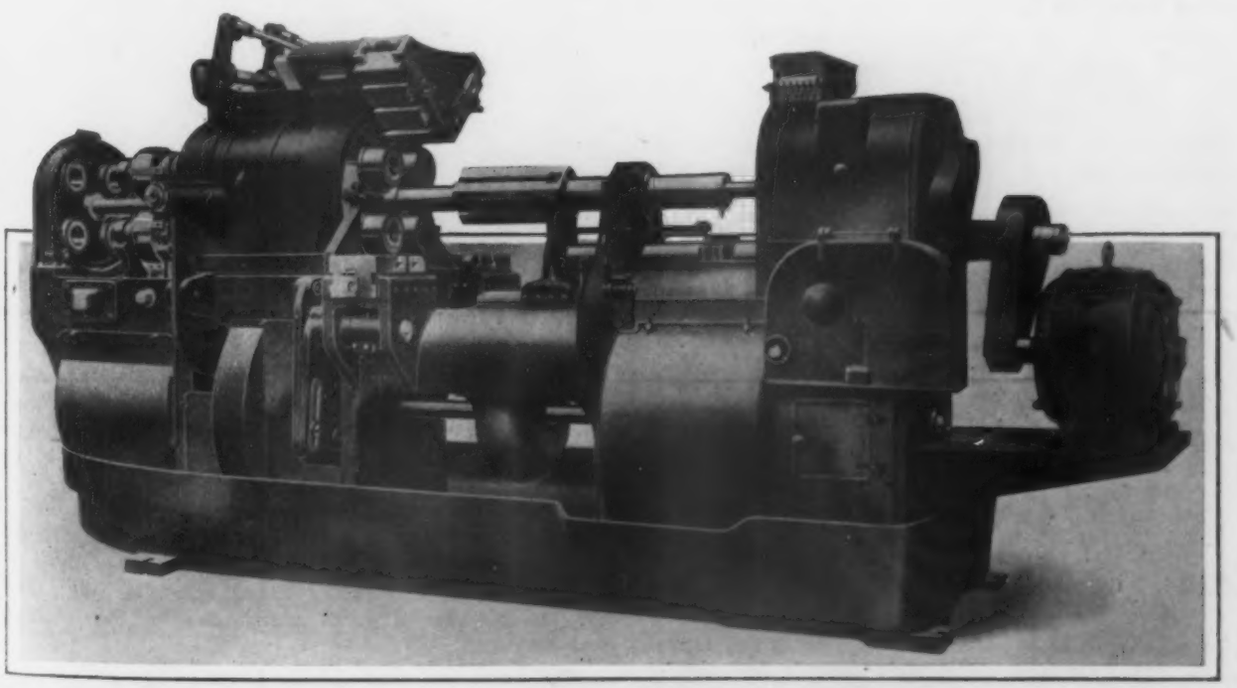
A NOTABLE addition to the line of multiple spindle screw machines built by the National Acme Co., Cleveland, is found in this company's new four-spindle machine that is built in two sizes for bar work up to 3 in. and 4 in. in diameter. This machine is an evolution in the development of multiple spindle screw machines to meet the new requirements of users for a machine for larger diameter work than could be produced on the company 2¼-in. machine.

New features are found in the design of this machine, necessitated by the larger capacity and to meet other requirements of accurate and more rapid production work and so provide a machine capable of doing work of a character that has heretofore been impossible in the multiple spindle screw machine field. These include a heavier and more rigid design to make the machines suitable for cutting the tougher steels now used, a simplified design, and faster cutting feeds made possible by the use of cutting tools of better quality. Other features include the standardization of equipment, convenience in operation and reduction in unit driving power.

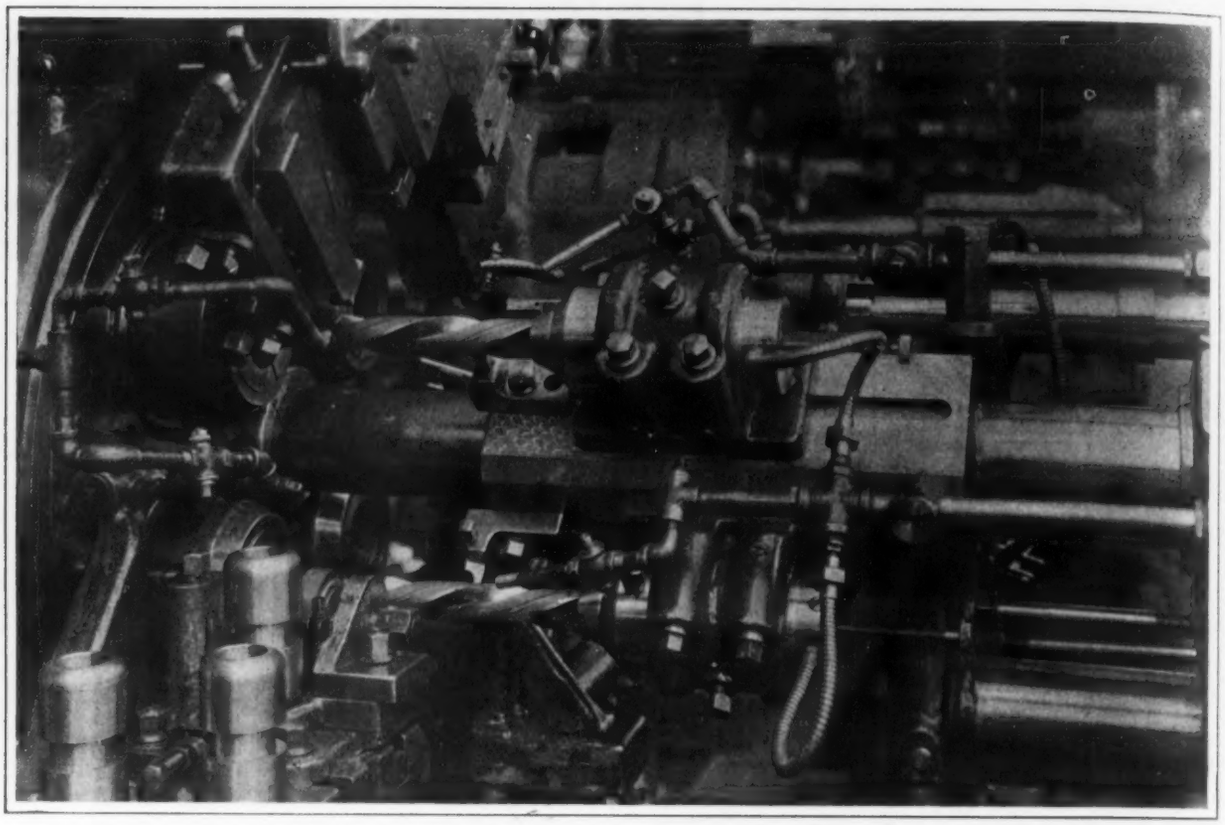
With the changes in design, there has been no deviation from the principle adopted in the design of the first Acme machine built over 25 years ago when the builders of this machine originated the method of performing all the screw machine operations in the time of the longest single cut.

The main tool slide or end tool turret is a one-piece steel casting with a double end and center support. One end extends in front of the four-faced turret proper, having its bearing in the center of the cylinder. The rear end is supported in a heavy bearing through an upright extension of the frame, which is cast integral with the bed itself. The end tool turret is supported just back of the tools by an extension of the pusher rod which controls the feed of the tool carrier. This pusher is independent of the tool carrier proper, being connected to the carrier at the top by a pin and at the bottom traveling on a wide bearing plate mounted on the center of the frame. From the pusher rod there is an extension with a roller for the lead cam. This extension is fastened to the pusher rod, which is supported at a 45-deg. angle with respect to the lead cam, and its movement is against a hardened steel plate screwed to the bed. The bearings receive no end thrust from the lead and take-back cams.

Because of the rigid method of supporting the tool



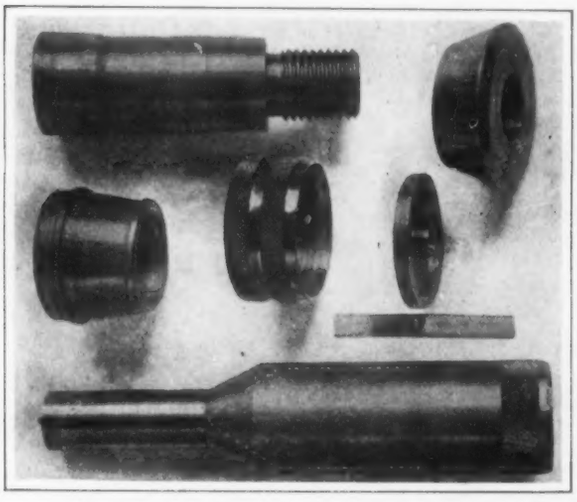
New Four Spindle National Acme Automatic Screw Machine Built in Two Sizes for Accurate and Rapid Production on Bar Work Up to 3 In. and 4 In. in Diameter



The Main Tool Slide or End Tool Turret Is a One-Piece Steel Casting with a Double End and Center Support and Is Designed to Provide a Wide Bearing Surface for the Tool Holders

carrier, side thrust is equalized so that heavy cuts and coarse feeds may be employed to the maximum capacity of the machine. The stop rod between the pusher and the carrier is the main stop for accurately regulating the length of the turret travel. This is controlled by nuts adjusted for different lead cams. Tool holders having wide bearings are fastened against the four flat surfaces of the turret and are supported directly underneath their cutting points, with no overhang.

The forming and cut-off slide bearings are cast with the bed and so designed as to support the forming tool its entire length and directly underneath the cutting pressure. The connection between the forming and cut-off levers and their slides is through a 2½-in. hexagon shaft, thus to assure a positive feed to the slides without spring. The slides are adjusted vertically by taper gibs and horizontally by straight gibs. The levers controlling the feed of the cross slides are provided with slots, making them easily adjustable and requiring only minimum change of cams for different feeds. With the adjustable arrangement for forming and cut-off levers, only three cams are required for normal work, these being supplied with the machine.



Typical Work Indicative of Wide Adaptability

The top slides are controlled by two straight and interchangeable cams through rods and levers arranged so that both slides can be adjusted by manipulating one interchangeable cam on the main cam shaft. A hexagon lever shaft controls the travel of both slides thus to obviate loosening, as is common in a key set shaft. The top slides accommodate the same holders and tools which are used on the forming and cut-off slides and the method of adjusting these slides by gibs is the same. A forming stop consisting of a bracket mounted on the slide in connection with adjustable studs located between each of the four spindles provides a separate adjustment for each and is a further safeguard for uniformity of product. To facilitate quick, accurate adjustment for the depth of cut for the forming and cut-off tools, screws are operated through the center of the slides independent of the tool holders.

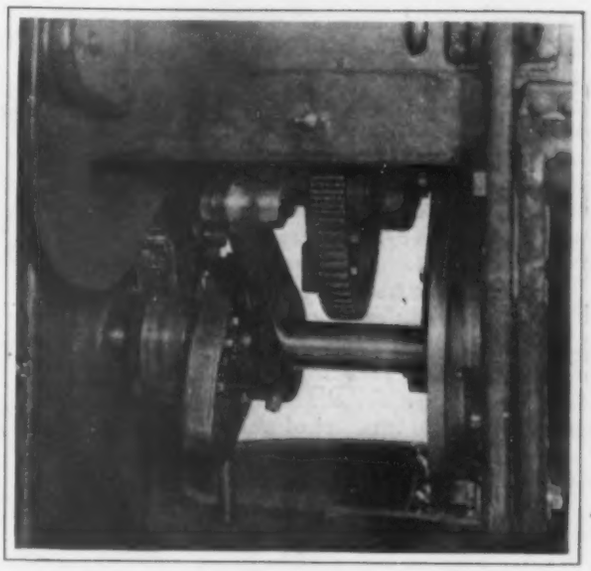
New features are provided in the cylinder construction to minimize wear and provide easy adjustment. The cylinder casing is set into the bed in addition to being secured to the bed by heavy bolts. Two brass shoes for adjusting the cylinder and casing are located independently on top of the cylinder casing for both front and rear bushings and are adjusted by screws without interference with the top slides. This adjustment is made toward the center of the machine, where the greatest strain occurs. Compensation for end wear is provided in a takeup located on the rear of the cylinder, secured by adjustable brass shoes on the reel cross support and tightened to the cylinder. The cylinder does not depend upon its bearing against the adjustable shoe resisting the end thrust, because the front of the cylinder casing is counterbored, thus giving the cylinder a front thrust bearing its entire periphery.

The front and rear spindle bearings are of bronze and of the straight type with thrust bearings. Attention is called to the fact that the spindles proper are

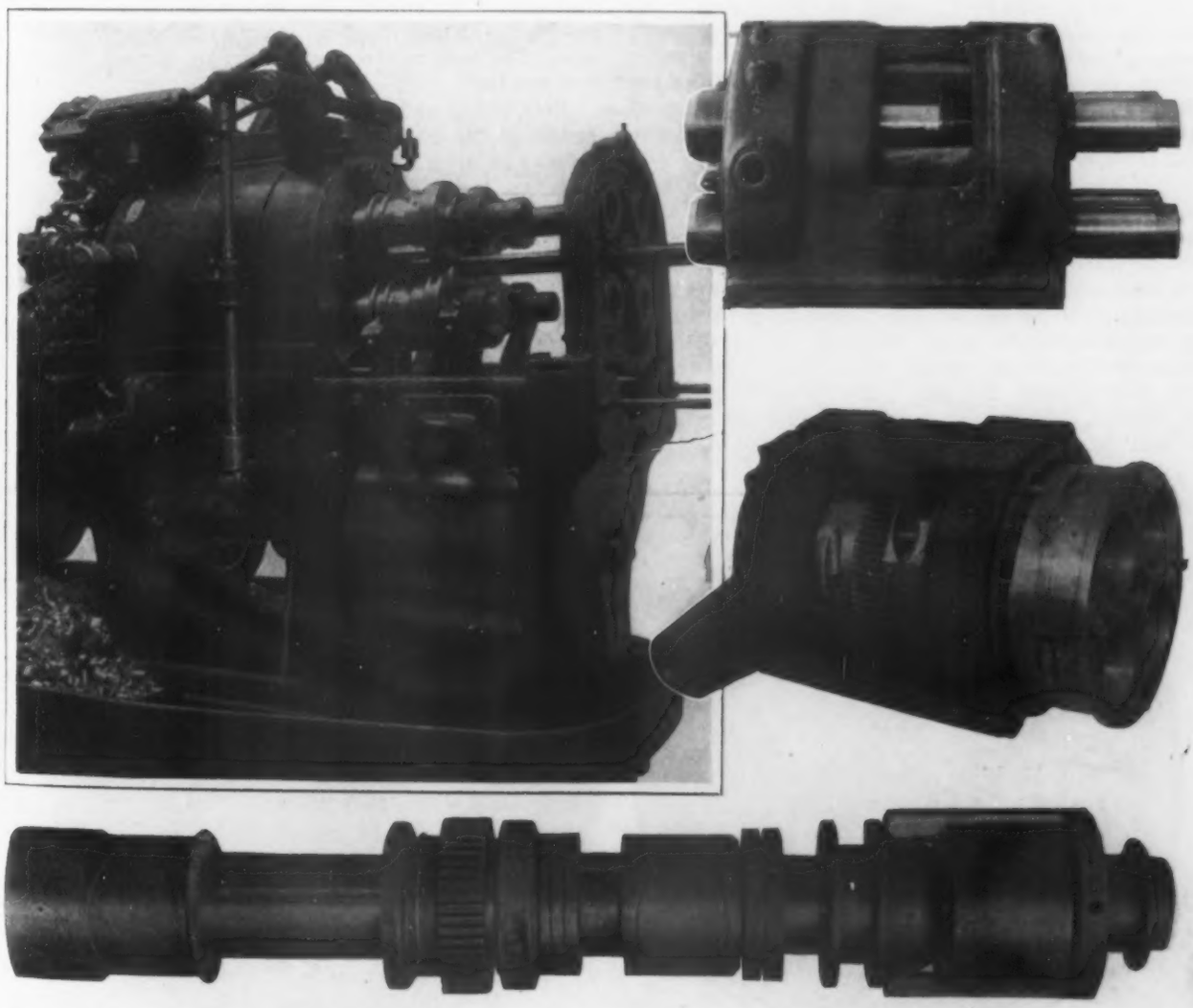
not affected by wear because a main bronze bearing is secured to the spindles and runs in a hardened steel bearing fitted to the cylinder. The spindle gears are located centrally between the bearings instead of at the ends of the spindles. With this construction the pressure of the gears tends to equalize the action against the bearings on the spindle, and at the same time affords rigid support owing to the fact that the bearings are located farther apart. This form of construction, it is explained, results in an easy rotative action, less power required, higher cutting speed and easier replacement of both spindle and cylinder bearings when worn.

The drawback type of chucks are used for holding the stock while cutting. The advantages claimed for the drawback type of chuck as compared with the pusher type are that it runs true because it is drawn back in a taper which has been ground in the spindle itself, the stock feeds forward more easily, the chuck holds more tightly under heavier end thrust such as drilling or heavy turning, there is no strain or spring at the stock stop because in locking stock with the drawback chuck the bars draw away from the stop instead of pushing against it, and this type of chuck protects the spindle bearings when forming because it permits of a shorter projection of the spindle from the cylinder.

The machine is not fitted with a threading spindle unless so ordered. The threading spindle runs independent of the travel of the main tool carrier and has two cutting speeds and two speeds for running off the work. A double gear is used, one mesh for one speed and one for a different travel. Spindle speeds are varied by shifting the double gear. Change from left hand to right handed threads is accomplished by reversing the cams operating the friction. When button dies or taps are the threading equipment, an extra holder is used, but for opening dies or collapsing taps only the regular equipment is required. It is explained no arrangement is provided for stopping the die spindle to allow for



Turnover of the Stock Carrying Cylinder Is Accomplished By the Geneva Movement, Which Is Explained as Quick, Positive and as Operating with Minimum Strain and Wear



The Cylinder Carrying the Four Spindles and Casing, the Spindle Head Assembly and Spindle Construction Are Shown in the Three Right Hand Illustrations. A feature is the location of the spindle gears centrally between the bearings instead of at the ends of the spindles. The feeding and chucking mechanism are shown in the left-hand view

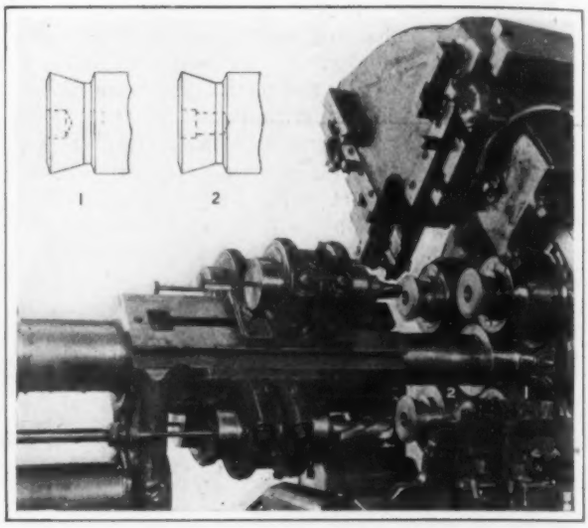
special operation features as on the smaller machine.

The turnover of the stock carrying cylinder is accomplished by the Geneva movement and is explained as quick, positive and with minimum strain or wear. Locking of the cylinder in the four successive positions is secured by a latch bolt on the forming side of the cylinder and a lock bolt on the cut-off side. This arrangement has been found practical because the lockbolt naturally pulls the cylinder down, and with this design there is less competing pressure. Positive operation of the lock bolt is controlled by a spring directly in connection with the bolt and by a cam and roller from the main cam shaft, thus securing a rigid locking when heavy or extra long bars are used.

Stock is fed in either the first or fourth spindle positions according to the class of work. The wedge levers for opening and closing the first and fourth position tubes are readapted by reversing the brass shoes. The stock stop movement is changed by shifting the cam lever 30 deg. on the square end of the hexagon shaft and moving the cam backward to give the proper throw. The slide controlling the stock feed is independently cammed and has its bearing on two rods located between the bed casting and an end bracket support on the end of the machine. It is equipped with double levers connected by rollers, and one of these rollers is changed into the two positions for the 6 and 12 in. feeds. Intermediate feeds are secured by adjusting the collar on the stock pusher rod.

The bracket carrying the stock reel is fastened to the extreme end of the bed. It is equipped with eccentric studs and rollers to guide the reel disk for a smooth turnover. This disk is keyed to a shaft which in turn is held in a bracket on the center of the cylinder. The extension of the shaft on the reel stand is independent, and it is fastened to the outside of the reel by a plunger so that the feed tubes may be removed by lifting the plunger and sliding the disk back on the extension of the reel shaft. The disk is provided with bushings to suit the size of the stock used.

The pan is constructed with three ribs in the floor portion. The bed, which is screwed to the pan, is in one piece except the cylinder casting, which is screwed and dovetailed as previously explained. The main gears are steel and the levers and main tool carrier are steel castings. Ample clearance is provided for chip room by open construction below the main tool turret. The center bed is oval in form, allowing chips to be washed out quickly into the pan. The general operating mechanism, forming and cut-off are under the cylinder, so that the chips are separate from the working parts.



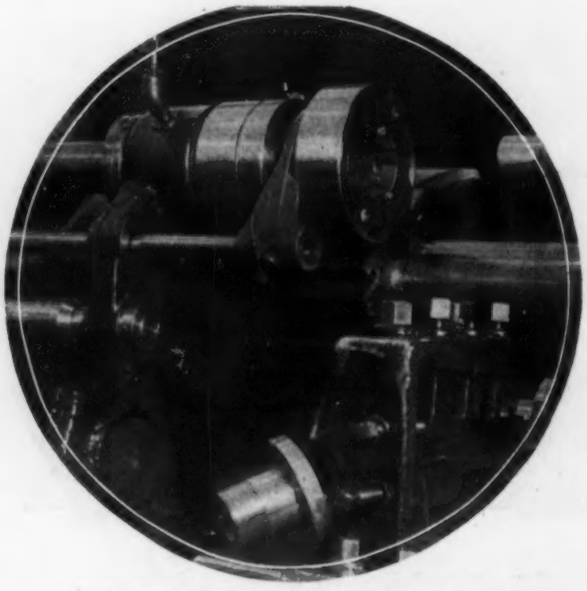
Tooling for Gear Blanks. Position 1 feeds the stock, rough forms and drills part way. Position 2 finishes forming and drills

All the tools on the main tool carrier are inside the circumference of the spindles, thereby allowing for tool construction of various sizes and shapes without interfering with each other or the center turret extension.

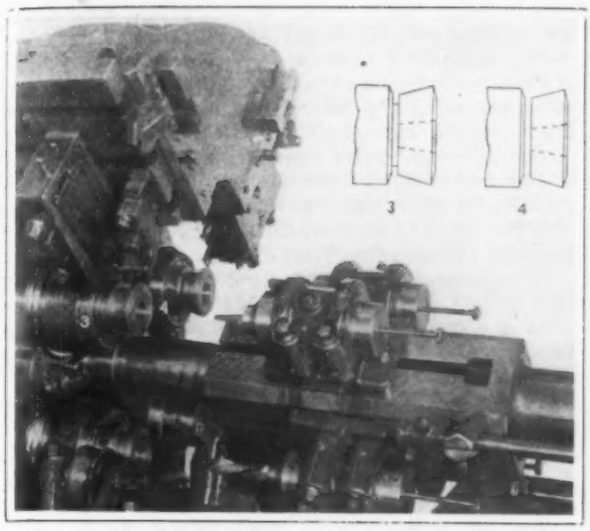
The bearings for the back gears and for the worm drive are connected with a single oil reservoir mounted over the gear box. The oil feed is regulated individually by thumb screws at the bottom of the reservoir and by the oil tubes having a main shut-off so that independent adjustments do not need to be disturbed when the machine is stopped. The main spindle bearings are provided with oil chambers supplied by gravity feed cups. The tools receive their oil supply through forced feed pumps.

Both safety and convenience were considered in the design of the machine. All working parts, such as gears, cam drums and friction, are completely housed. A safety device is applied directly to the worm gear on the cam shaft. Instead of keying the worm to the cam shaft, a disk is keyed on the shaft parallel to the worm gear and joined with shearing pins which are easily replaced when broken. This device prevents accident due to errors in setting up the tools or carelessness in operation. Similar precautions have been made for safety with respect to the main driving mechanism in which provision is made for cranking by hand from the forming side of the machine, thus to permit the operator to observe the movements of the tools while setting up.

Reamer Attachment and Carrier for Heavy Work



Threading Attachment with Opening Die



Tooling for Gear Blanks. Position 3 taper reams and breaks down for cut-off. Position 4 cuts off the gear blank

The starting clutch lever for throwing into automatic feed is also controlled from either side, and when thrown into automatic feed the hand crank is automatically disengaged, eliminating the possibility of accident due to negligence. Special attention is called to the fact that the tool turret is at a convenient working height for operation.

The machine is furnished with either belt or motor drive. When motor drive is specified the standard equipment is a 10-hp. motor for the 3-in. machine and a 15-hp. motor for the 4-in. machine. A high speed drilling attachment and an accelerated reaming attachment can be supplied.

Minor Executives to Study Production Methods

In order to give its minor executives a thorough knowledge of its business and the broad industrial principles underlying it, also to enable them to understand and handle labor more effectively, the Malleable Iron Fittings Co., Branford, Conn., has organized a course in modern production methods. There are 63 men, including superintendents, assistant superintendents, foremen, office manager, coremaker, shipping clerk, clerks and stenographers, studying the course. The policy of the company in doing this is summed up by George B. Pickop, assistant superintendent, as follows:

"Realizing that production is dependent not only on the technical but also on the social relations between the management and the employees, we have decided to make all relations as harmonious as possible. All the ideals, policies and orders of the management must be transmitted through the foremen and other supervisory executives, and on how well these men transmit them depends the attitude of the employees."

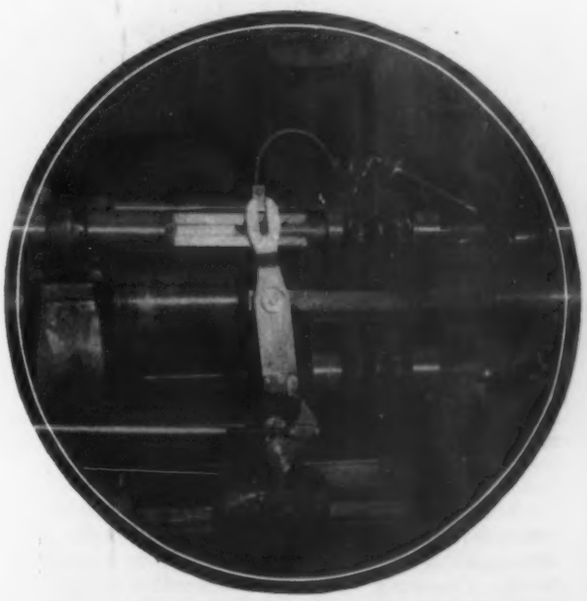
Studies to be taken up are teamwork in industry, the handling of employees of different types, improved methods in factory organization, efficient handling of materials and machinery costs—how to calculate them and reduce them, modern ideas of management. Such subjects as safety, labor psychology, plant layout, routine, stockkeeping, cost accounting, etc., are to be emphasized in order to help the men develop themselves as industrial leaders and to better their positions. They are taught how to analyze their personal characteristics and how to strengthen the necessary qualities for leadership.

The course covers three months. The men study six text books and, after reading each one, must solve a practical problem based on it. These answers are carefully criticized and rated, and the men given individual attention. Every two weeks all meet for a lecture by some expert and for general discussion of problems and of questions. The details of the course are handled by the Business Training Corporation, 185 Madison Avenue, New York. Personal supervision of the work is in the hands of V. T. Hammer of the company.

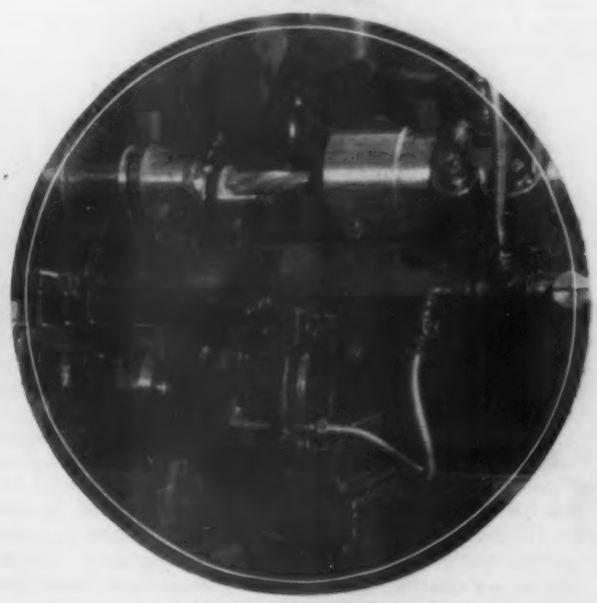
Steel Plant Power Generation

Steel plant power generation from waste heat and coal was discussed in a paper by B. H. Greene, steam engineer, United Alloy Steel Corporation, Canton, Ohio, at a recent meeting of the Cleveland district section of the Association of Iron and Steel Electrical Engineers. The paper presented some of the practical problems encountered in the utilization of waste heat from open hearth furnaces for the generation of power for steel mill use, and included a description of an installation wherein the steam derived from waste heat was supplemented by coal fired boilers and used for electric power generation. A copy of the paper can doubtless be had by addressing J. F. Kelly, secretary, Association of Iron and Steel Electrical Engineers, 513 Empire Building, Pittsburgh.

The work of construction of eighty ovens to form the first unit of the plant of the St. Louis Coke and Chemical Co. at Granite City, Ill., has begun and it is expected that the ovens which will produce coke and by-products under the Roberts process will be in operation in about 10 months. About 600 men will be put on the work as rapidly as they can be obtained.



Attachment for Accelerated Reaming



High Speed Drilling Attachment

COKE OVEN WORKING ABROAD

Why the Long Coking Time—Marked Differences in Arrangement

What difference exists between coke oven plants in Europe and in the United States was brought out in an address made before the Engineers' Society of Western Pennsylvania by John I. Thompson, chief engineer Koppers Co., Pittsburgh. What he had to say was in part as follows:

Multiplicity of Units

The multiplicity of units to handle a small tonnage is very noticeable. We visited a plant in France which will carbonize about 2400 tons of coal a day. It was composed of six batteries of ovens arranged, not with a common center-line, as is our custom, but each battery separate, with parallel center-lines and individual coal bins. This necessitated a pusher machine for each battery, two coal charging cars for each battery—the gas collecting main being in the center of the battery—and extensive duplication of coal- and coke-handling equipment. When one considers that the shortest possible coking time in this plant was 24 hr. and the normal time 30 hr. giving a pushing schedule of 35 to 45 min. for each machine, it is evident that this arrangement is the cause of a great waste of equipment and labor.

A modern American plant of this capacity would be equipped with one coal bin, instead of six; two combined pushers and levelers in operation, instead of six; one coal charging car in operation, instead of 12. It would contain two batteries of about 60 ovens, instead of six of 42.

In England, we visited a plant similarly arranged constructed during the past few years by another builder. Of course, not all the plants were arranged in this way. We visited a new plant in Wales which was just ready to be put into operation. The details were carefully thought out, and the construction work beautifully executed. The nominal capacity is about 1200 tons of coal a day with a coking time of about 26 hr. For such a small capacity, we were impressed with the excessive amount of equipment provided. The plant is composed of 120 ovens, split up into four batteries of 30 ovens each, arranged in one line. With the larger ovens and the shorter coking time obtained in this country such a capacity would be conservatively obtained with 70 ovens which would be constructed in one or perhaps two batteries.

The cost of these plants, assuming the same unit prices for labor and material, must be considerably higher per ton of coal carbonized than similar plants as designed in this country. If for no other reason, the long coking time which reduces the capacity of European ovens, as compared with American ovens of the same volumetric capacity, must add greatly to the cost of construction.

Why Washed Coal Is Used Abroad

The mining of bituminous coal in France and Belgium is very different from the mining operations with which we are familiar. The mines are very deep, many of them over 3000 ft. below the surface. The coal is relatively very much more costly at the pit mouth, and, as a consequence it is mined and handled much more carefully than in America. Practically all the coal is carefully screened and washed. The larger sizes are sold at higher prices for special purposes, and only the very fine material is used for coking. The slurry and fine coal are also made into briquets, which are used quite extensively for locomotives on the railroads.

We were told that an ordinary guarantee for a coal washing plant was 2 per cent ash with a loss of about 2 per cent of good coal in the washery refuse. The ash content before washing was in some cases as high as 15 per cent or more, which would make the coal useless for coking purposes without washing. In the plants we visited, the washing water was used over and over again, thereby avoiding the contamination of streams with waste water. Draining bins seemed to be the common method of drying the coal.

We have much to learn from Europe along the lines of conservation. As our rich gas coals and coking coals become scarce, and therefore more valuable; as our mining costs increase, due to the increased cost of labor; as freight rates increase, making it unprofitable to ship fuel with high ash content; and as the consumer realizes the economies which may be effected by the use of a cleaner and more uniform fuel, we will be forced to adopt European methods of conserving coal.

The largest plant we visited carbonized about 2400 tons of coal, while a plant of 1200 tons capacity is considered a fairly large one. It would be practically impossible to handle the tonnages to which we are accustomed, with the ovens and the apparatus in use in Europe.

No Central Quenching Station

The general practice in Europe is to push the coke out of the oven, through a coke guide composed of perforated pipes, on to an inclined wharf extending the full length of the battery. From this wharf it is either forked by hand into cars—the forking operation taking the place of mechanical screening—or it is fed through gates, extending the full length of the wharf, to a steel pan conveyor which conveys it to a screening station. Quenching immediately in front of the oven was abandoned several years ago in this country, but we did not see a plant in Europe with a central quenching station.

The continuous wharf of massive, arched concrete or brick construction, covered with cast-iron plates and equipped with feeder gates the full length of the battery, is very expensive; and steel pan conveyors are not suitable for handling coke, due to the abrasive action of the coke on their many moving parts. For the same service we would employ a single wharf instead of six, and one conveyor and central screening station instead of three.

Silica Brick Not Used Abroad

It is the practice in this country to use silica material in by-product coke-oven construction. I think there is not a single battery of ovens in England, France or Belgium constructed of silica brick—the material used ranging from what we would term fire-clay up to quartzite, with a maximum silica content of about 85 per cent. The fusing temperature of silica brick is higher than the fusing temperature of brick such as they use; but more important still, the softening point under load is 500 or 600 deg. Fahr. higher for silica brick than for fire-clay or quartzite brick. Temperatures as high as 2700 to 2750 deg. Fahr., which we maintain in the heating flues without injury to the brickwork, cannot be obtained with material of lower silica and higher alumina content.

For this reason there is much greater safety in operating a battery of ovens composed of silica material. The walls of the heating flues may be at the fluxing temperature before they will fail, but a clay brick wall will soften and deform under its own weight before its fluxing temperature is reached. Silica material also has greater conductivity, which, added to the much higher temperature head available, makes it possible to transmit the requisite heat through the walls and into the coal in a much shorter space of time. Silica brick expands to a greater extent than fire-clay brick, but it has the convenient quality of continuous expansion at all temperatures up to its softening point. Fire-clay brick, however, expands up to about 2000 deg. Fahr. and then contracts. It is practically impossible to keep coke-oven construction gas tight under such conditions. As expansion takes place, the tie-rods and buck-stays can be loosened, but tie-rods and buck-stays will not close the joints opened up by contracting brickwork.

The Matter of Uniformity of Operation

A good operator here will fix the coking time to meet the coke or gas requirements within the limits of the capacity of the plant and insist on absolute regularity of pushing. The men responsible for the heating must see that the coke is ready to be pushed at the

scheduled time. Such regularity of operation is not obtained in Europe. Either the plants which we visited were not properly operated, or their design and construction are such that they could not be properly heated. The heats were generally not uniform.

Nowhere did we see any serious attempt to control the gas pressure in the oven chamber. With leaking walls and wide ranges of pressure within the ovens it is impossible to obtain good heating. It is not putting the case too strongly to say that we did not visit a plant in which the gas was properly burned and the ovens uniformly heated.

High moisture content has some effect on the coking time, but in 16 hr. we have coked coal with 15 per cent moisture—so wet that the water ran out of the oven doors—in an oven with an average width of over 19 in. A difference in the quality of the coal may affect the coking time but cannot be charged with a difference of 10 to 14 hr. We did not visit a plant that was pushing coke in less than 30 hr. and the maximum practical speed in the newest plants is 24 hr.

Size of Coke

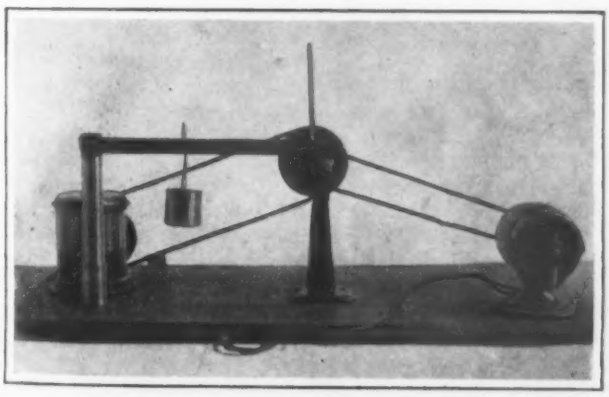
Short coking time does decrease the size of the coke. Practically all the coke I saw pushed in France and Belgium was very large and very blocky. I was told that blast-furnace operators would not accept the small coke we sometimes make in this country; but it is a fact—which will be corroborated by any blast-furnace operator present who has used by-product coke—that by-product coke, due to its uniformity and perhaps for other reasons, does reduce the fuel consumption and quite often increases the iron production in blast-furnaces. There has been a prejudice in this country against the small coke produced in some of the by-product ovens, but I think that prejudice is gone. In fact, some operators prefer the smaller coke, provided it is uniform.

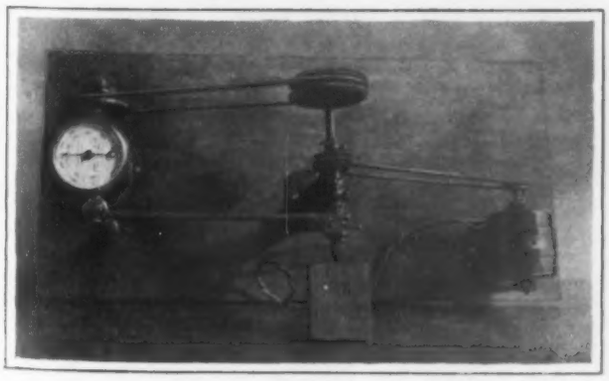
Choosing the Efficient Abrasive Wheel

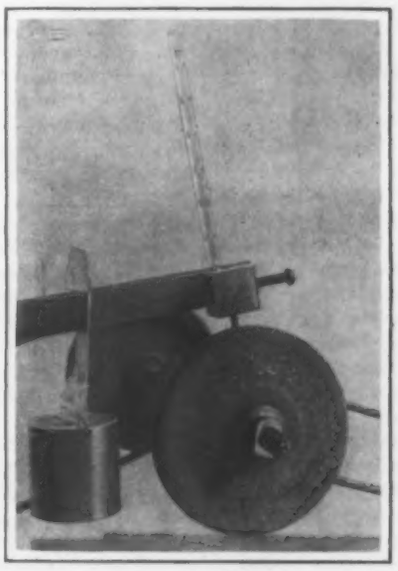
Hard and Soft Wheels—Practical Tests for Cutting Efficiency —Machine for Determining Comparative Abrasive Values

BY RAYMOND FRANCIS YATES*

IN every industrial establishment of any note, some operation is performed by grinding wheels. In some cases, grinding machinery constitutes the entire shop equipment. To choose abrasive wheels that will perform efficiently requires a knowledge of the physical properties of abrasives in general that is not usually in the possession of the men who do the ordering or buying. Many make the mistake of re-ordering wheels that last the longest. A wheel may last a long time, but what is its cutting efficiency? That is the important consideration that overshadows everything else. A hard wheel may last a month on the job, but a soft wheel may grind twice as many castings, although it will last only three weeks. The author recalls to mind an incident where a hard wheel ground 1550 castings a day for 21 days. Another softer wheel was used that ground 2115 castings in a day and lasted 19 days. The difference in production here is astounding and completely offsets any additional expense in wheels. The writer does not wish to have the reader believe that he is arguing in favor of soft wheels. Not at all. The point to be brought out is: "Use the right wheel in the right place," as one of the large manufacturers puts it. In the face of these obvious facts, however, many men endeavor to keep operating expenses down by employing wheels that appear to last longest.







Machine for Determining the Cutting Efficiency of Any Wheel on Any Material. A hole drilled in a copper block accommodates the test piece, as shown in the above illustration, the pressure on the wheel being regulated by a movable weight on the lever arm. The factors determined are temperature, velocity in surface feet per min., pressure, amount of metal removed and time

The words hard and soft are not really comparative terms. A wheel may be too hard for one job and too soft for another. If a wheel is too hard for one job, its bond insists on holding onto the abrasive particles after they have lost their sharpness or cutting power. Such a wheel is very inefficient and will glaze badly. If the wheel is too soft the abrasive particles break away from their setting in the bond before they

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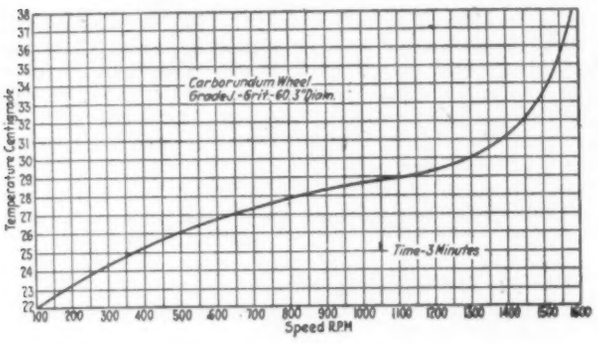
have lost their cutting power. Such a wheel wears away very rapidly, but, on the other hand, it cuts very well. The ideal wheel is the wheel with a bond that permits the abrasive particles to drop off and expose new particles just at the point where the old ones become dull. With the wide variety of grits, grades and bonds manufactured, it is possible to purchase a wheel with just the right characteristics for most any job.

The writer takes the liberty of quoting a statement made in the Norton company's catalog: "Conditions under which grinding wheels are used vary to such an extent that no absolute rule can be given for selecting



The Performance of a Small Wheel Under Test

the right grades for the work." This is a plain statement made by a reputable manufacturer. Yet how many purchasing agents and shop foremen choose wheels at random and use them without any further investigation? There is only one thing to do and that is to conduct a practical test on several different wheels before a great number are purchased.

The test of an abrasive wheel should really be conducted or supervised by the efficiency engineer. Handing the wheel to the workman with the instructions to make a test and report on it is rather a haphazard method of performing a test. The average workman does not understand abrasive wheels enough to make an intelligent test. A knowledge of mathematics is another necessary attribute that the workman is not apt to have. Under these circumstances, his report is just as apt to be favorable as unfavorable. To say the least, it could not be depended upon.

In making a wheel test, an unlimited supply of the castings or pieces to be ground should be available. The test should be run over a period of time extending from 25 to 50 hours. The longer the test is run, the more accurate the figure for the average cost per piece will be. The following notes should be made for the test: Nature of piece to be tested, material to be ground, make of wheel, grade, grit, bond, operating speed, cost, size of wheel, cost per pound, weight of wheel before test, weight of wheel after test, reduction in weight, cost of abrasive material using pound rate, length of test, workman rate, labor cost, total cost of grinding, and cost per piece.

Such a test will give some very valuable information relative to the working efficiency of a wheel. The above is a very practical test and by no means scientific; it may suffice for ordinary purposes, but if a more accurate result is sought, a more thorough and scientific test must be conducted.

The writer recently designed a machine for determining the cutting efficiency of any wheel on any material. The machine as shown in the accompanying illustrations, is of a miniature type for testing small wheels not over 3 in. in diameter. The wheel to be tested is mounted upon the spindle of a small grinding head in the usual way. The end of a lever comes to rest upon the top of the wheel. Attached to the end of this lever is a copper block. A hole drilled in the copper block accommodates the test piece, which, in the writer's case, was ⅛ in. in diameter by 1 in. long. The test piece is held securely in place by a set screw. Immediately adjacent to the hole for the test piece, another hole is drilled to accommodate the end of an ordinary chemical thermometer. A little mercury poured in the hole before the top of the thermometer is put in produces a very good thermal connection between the test piece and the thermometer.

The lever of the machine is provided with an adjustable weight by means of which the pressure of the test piece on the surface of the wheel can be regulated. The machine is driven by a small electric motor in connection with a rheostat for speed variation. A tachometer is belted to the grinding head with a known ratio, preferably 1 to 1, so that the speed or velocity of the wheels in surface feet can be found.

The following factors are made known by the device: Temperature, velocity in surface feet per minute, pressure, amount of metal removed, and time. Temperature is a very important consideration, as it is a direct indication of friction. If a wheel glazes or it is too hard, its particles become dull and they merely rub over the surface of the metal. The heat produced is indicated directly by the thermometer on the machine. If a wheel is soft enough, the friction will be low and, consequently, the heat produced will be low.

The actual formula for use with the machine is:

$$Efficiency = \frac{tvpT}{L}$$

Where t = Temperature
v = Surface velocity
p = Pressure or load
T = Time
L = Metal removed

The accompanying curve shows the performance of a small wheel under test. The speed of the wheel was gradually increased until 1600 was reached. Above a speed of 1200 r.p.m. the temperature of the test piece raised rapidly. This did not necessarily indicate that the wheel used was too hard, but it did indicate that the speed was entirely too great. The efficiency of the wheel rapidly decreased beyond a speed of 1200 r.p.m.

Corrosion in Wire Ropes

Experience has shown that wire ropes of compound construction, subjected to corrosion influences, are likely to deceive engineers as to the strength remaining in them, says a circular issued to managers of mines on the Rand, South Africa. Where reduction of diameter or circumference of the rope has taken place, not accounted for by the evidence of wear, the part of the rope under examination should first be fully loaded and then relieved of the load. Any noticeable difference in circumference under these circumstances and the slackening of the outside wires when the load is off will indicate that internal corrosion has taken place. The extent of corrosion inside the strand can only be estimated by the slackness of the outside wires. The corrosion between the strands can be further examined by untwisting the rope or displaying the strands sufficiently with a marline spike.

Engineers are apt to imagine that reduction in the size of a rope may be due to some collapse of the hemp core. In a test at the mines department mechanical laboratory of a 1.28 in. diameter rope, the hemp core was entirely removed for about 5 ft. of the length. The specimen was gradually loaded up to 30 tons, but beyond a slight increase of the lay from 10½ to 11 in., subsiding after test to 10¾ in., there was practically no alteration in the shape or size of the rope.

In some recent tests of corroded ropes, the following results were obtained:

Original diameter, in.		Original breaking load, lb.	Diameter at test, in.	Breaking load at test, lb.
Rope	Wires			
1.50	0.099	222,208	1.41	191,960
1.50	0.099	222,208	1.40	166,660
1.50	0.099	222,208	1.30	137,260
1.50	0.099	222,208	1.23	66,880
1.50	0.102	220,000	1.22	97,260
1.25	0.115	148,700	1.23	137,660
1.25	0.115	148,700	1.00	78,920

In all the above-mentioned cases the outside wires were less than half worn, but the internal corrosion was excessive. The wires were brittle also. Experience has shown that the remarks concerning corrosion on the certificate of biannual tests are taken as merely applying to the test specimen and not considered as having a bearing on the state of the rest of the rope.

Properties of Bronze and Babbitt Bearings

Composition of Tin-Base and Lead-Base Metals—Effect of Pouring Temperatures—Defects due to Machining

NOTES on bronze and babbitt bearings was the subject of a paper presented by W. K. Frank, vice-president Damascus Bronze Co., Pittsburgh, before a recent meeting of the Engineers' Society of Western Pennsylvania. After discussing the various types of bearings and their lubrication, the speaker took up the question of the composition of bronze and babbitt bearings. Mr. Frank's remarks on bronze and babbitt bearings and important points in the discussion are given largely in full below.

Bearing metals are essentially a mixture, the components of which are distinctly different in hardness. In these metals the softer crystals are abraded faster and develop into depressions, allowing the harder ones to stand above them and support the load. These softer crystals perform another function also. A bearing should be plastic to a limited degree, since fitting is more or less of a rough approximation. Furthermore, a change in alignment of the shaft will produce points of concentrated pressure and the bearing must be capable of reseating itself to distribute its load properly.

Another bearing requirement is that it shall protect the shaft against injury. In most designs the bearing is the less costly part and is the more easily replaced, hence its harder element should be softer than the shaft. The bearing should also be of such a nature that it will not grip or be capable of welding itself to the shaft in case it becomes heated, as serious damage will be done should this occur. Other considerations require that these alloys conduct and radiate the heat of friction readily, that they wear slowly and show small friction and that they be capable of uniform production.

It will, therefore, be seen that the range of selection for bearing metals has been greatly limited by these considerations. The only alloys we know of which combine the desired properties are the bronzes and babbitts. Babbitts fall into two general classes, the tin-base metals and the lead-base metals. Antimony, copper and zinc are the principal ingredients with the tin and lead, but sodium, cadmium, calcium, barium, bismuth, nickel, or aluminum are added in some cases.

Two Classes of Babbitts

The tin-base, or so-called genuine babbitts, are variations of Isaac Babbitt's original formula of 89.3 per cent tin, 3.6 per cent copper, 7.1 per cent antimony, and they vary in the percentages of all of these elements and sometimes contain lead or other metals. In these alloys the tin furnishes a plastic matrix, in which are embedded the harder crystals of the tin-antimony, copper-tin, or copper-antimony compounds.

Fig. 1 shows a tin-base metal. The dark background is the plastic tin matrix, the cubical crystals the tin-antimony compound and the six pointed "snow crystals" the copper-tin compound. In the lead-base alloys, the hard crystal forming elements are principally antimony and tin. The matrix is lead, an alloy of lead and tin, or the lead-antimony-tin eutectic, and the hard crystals are usually the antimony-tin compound.

Fig. 2 shows a typical lead-base structure, with the soft eutectic forming the supporting medium for the hard, cubical, tin-antimony crystals. In the case of lead hardened with sodium, cadmium, etc., these elements probably form compounds with the lead, the compounds constituting the hard crystals embedded in the lead matrix. Lead-base babbitts present a wide range of compositions and are commonly composed of lead, tin, and antimony. With a variation possible in each of these elements, it may easily be seen that almost an infinite number of combinations may be made. The lead is varied between 65 and 90 per cent, the tin between 0 and 40 per cent and the antimony between 5 and 20 per cent. Varying physical properties are obtained by different formulas, and selection of the proper one is determined by the character of the load, hardness of the journal, lubrication, pressure, and speed.

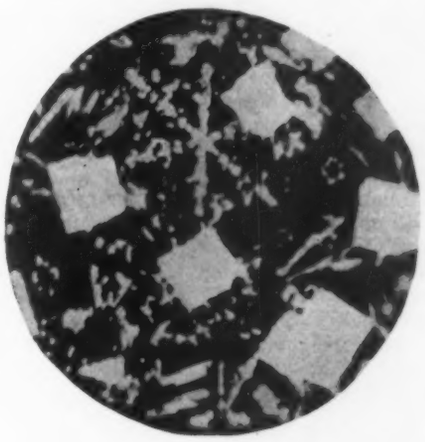


Fig. 1.—Tin-Base Babbitt, Magnified 75 Diameters. Etched with 5 per cent HNO_3

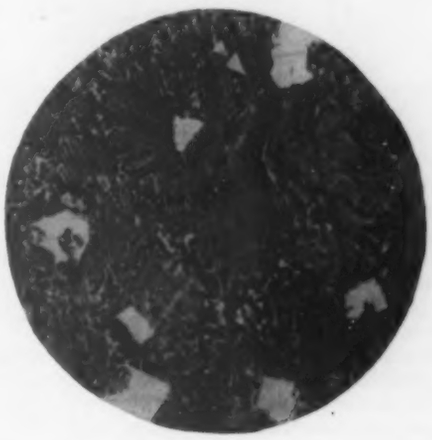


Fig. 2.—Lead-Base Babbitt, Magnified 75 Diameters Unetched

Babbitts are covered by tentative specification B 23-18 T of the American Society for Testing Materials. The table of physical properties appended to the specification shows that the Brinell hardness varies from 14.3 in the lead-base to 34.4 in the tin-base, and that the deformation with a load of 10,000 lb. varies from 0.007 in the tin-base alloys to 0.285 in the lead-base alloys. These properties indicate why tin-base alloys are preferred for some services, in spite of their higher cost.

Pouring Temperatures

It has been pointed out by T. D. Lynch, Proc. A. S. T. M., 1913 v. 13, p. 699-711, as the result of Hammer tests by the Westinghouse Electric & Mfg. Co., that pouring temperatures of babbitts largely influence their resistance to continued impact. The properly prepared tin-base alloys showed little difference in this particular from the properly prepared lead-base alloys, but it was stated that the allowable pouring temperatures of the tin-base babbitts showed a greater range than the temperatures for lead-base babbitts. The former are therefore more often properly poured and show better properties.

Lynch's best pouring temperature is 460 deg. C. (860 deg. Fahr.) for both types, while the A. S. T. M. figures are 616 to 638 deg. Fahr. for lead base and 661

to 916 deg. Fahr. for tin base. It may be said, however, that resistance and impact are not the only properties to be considered in babbitt metals, and that the tin-base alloys probably owe much of their popularity to their great fluidity, when molten. Special babbitts, commonly called white brasses or white bronzes, find application in well lubricated service. Their compositions approximate 66 tin, 29 zinc, 5 copper. Their

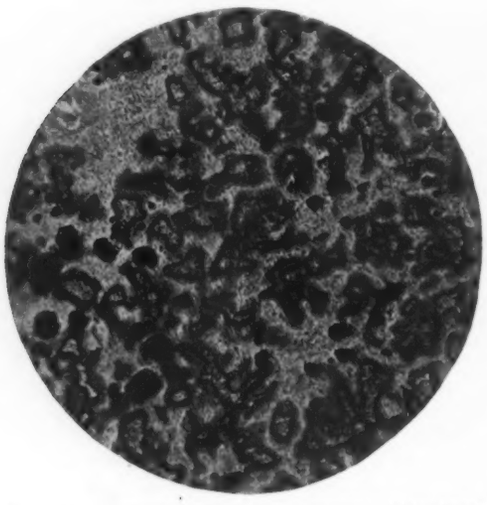


Fig. 3. — Copper-Tin-Lead Bronze, Magnified 100 Diameters. Etched with $H_2O_2 + NH_4OH$

Brinell hardness is high but on account of their more difficult handling they are not widely used.

Babbitts as a class show high plasticity combined with low Brinell hardness and compression strength, and these properties limit their application. Bronzes are, therefore, used where higher physical properties are desired to resist pressure or impact, or to provide longer service. Whereas, in the case of the babbitts, the softer element is the major constituent, so in the bronzes it is the minor constituent. Bearing bronzes are, in general copper-tin matrices filled with lead. The term bronze applies strictly to copper-tin mixture as differentiated from brass—a copper-zinc mixture. These terms are frequently loosely used, and it is quite common to speak of bearings as brasses. On the other hand, manganese bronze, Tobin bronze and a multitude of other so-called bronzes are in reality brasses, to which possibly one or two per cent tin has been added; and aluminum bronze is usually a mixture of copper and aluminum, sometimes with a small quantity of iron.

American Society of Mechanical Engineers Committee on Bearing Metals recently pointed out why bronze is preferred to brass in bearings. This has long been understood and the explanation given is undoubtedly the proper one. In the case of a bronze bearing metal of 90 copper, 10 tin, we secure a mixture of at least two dissimilar crystals and possibly three. In the case of copper and zinc, only one set of crystals is formed, up to a high zinc content. A homogeneous mass is formed as contrasted with the non-homogeneous mass of hard and soft elements in the copper-tin alloy, and the latter mixture is desirable because of the formation of the minute oil reservoirs, as has already been shown. The shop man will tell you that, in a bearing, brass is dry and harsh as compared with bronze, and it is undoubtedly the property of providing oil cells that gives bronze its value as a bearing metal.

Copper-Tin Bearings

Copper-tin mixtures have good hardness and compression strength. An increase is noted with additions of tin up to about 30 per cent, although at about 12 per cent brittleness begins owing to the increase in the eutectoid or bronzite constituent. Some bearings which require high compressive strength contain more than 12 per cent tin, but they should be used with caution. One specification for bearings on movable bridges, calls for a compression of less than 1/1000 in. on a 1 in. tube under a pressure of 24,000 lb. per sq. in., and less than 6/100 in. under 100,000 lb. per sq. in. The 90 copper, 10 tin alloy shows Brinell hardness of about 70 and compression of 0.20 on a 1 in. cube under 100,000 lb. per sq. in.

The majority of copper-tin bearings contain less than 12 per cent tin and combine hardness with ductility. They are limited to service where alignment is good, as they do not possess sufficient plasticity to conform readily to a shifting load. They find use in some machine-tools and similar equipment, where good alignment may be maintained, and are used abroad on some railroad equipment where speeds and pressures are not excessive and where fitting is carefully performed. With ideal service conditions, a copper-tin bearing will probably outwear bearings containing added metals, but in most classes of service localized pressures caused by changing alignment will produce rapid wear and heating in this composition. Zinc is sometimes added to copper-tin mixtures and the familiar gun-metal is composed of 88 copper, 10 tin, 2 zinc, but the most widely used bearing mixture is the copper-tin-lead bronze.

In bronzes containing lead, we have the reservoir-forming property further enhanced. The lead does not combine with the copper-tin structure, but is only mechanically held by it in the form of globules. It imparts plasticity to what would otherwise be a more or less rigid structure, in addition to furnishing it with additional oil reservoirs.

Fig. 3 shows a typical copper-tin-lead bronze. The light colored matrix is the harder copper-tin structure, while the light globules surrounded by dark margins are of similar composition, but richer in copper and softer than the matrix. The black globules are the lead and are still softer. It will therefore be seen that three distinct hardnesses are present. In this mixture we maintain the hard, wear-resisting points of the copper-tin alloy and can vary plasticity by varying the lead content. The lead can be added up to 50 per cent and this variation gives us the different properties required by varying classes of service. In some cases a very small quantity of lead is added. It produces hot shortness and is therefore not desirable in hot-mill bearings. These may run at very high temperatures, and bearings containing much lead will break under the pressures encountered. A typical low-lead formula of this type would be 91 copper, 8 tin, 1 lead.

High-Lead Mixtures

At the other end of the scale are found the high-lead mixtures containing up to 30 per cent lead. They find limited application because of their high plasticity and consequent distortion. They answer well the requirement of protecting the shaft, but do not, on the other hand, transmit heat readily. They show rapid wear, as is evident to anyone who has examined a pile of scrapped railroad car bearings. It is moreover, true that high-lead mixtures are difficult of uniform production. Since the lead is but mechanically mixed with the copper-tin alloy, and as lead has a much higher specific gravity, segregation to a greater or less degree is liable to occur in the crucible and mold. Lighter castings which cool quickly can be made with some degree of success, but lead segregation of heavy castings is an accepted evil. Auxiliary agents including nickel, ferro-manganese, and sulphur are used as preventives of segregation, but these are not reliable expedients. While it is not stated that castings cannot be produced without segregation, it is true that this mixture is easily mishandled and bad bearings result.

As in many matters, the best lies between the extremes, and in this case the moderately leaded bronzes best answer most bearing requirements. They can be produced uniformly and well, as no great difficulty is experienced from segregation of the lead. Alloys of this class range from 5 to 15 per cent lead, and 12 to 7 per cent tin, with the remainder copper. Copper, tin, and lead all tend to form oxides readily, and deoxidizers are often added. Phosphorus is the most effective of these, and is usually added in quantities in excess of that required for deoxidation and produces an additional hard constituent in the bronze. Phosphor-bronze, as the resulting alloy is called, is one of the most valu-

able of alloys in present day use, for a great variety of requirements. It presents a comparatively hard surface, and yet is sufficiently plastic to conform to moderate changes in alignment. It answers all the essentials of a good bearing, for moderately good conditions of service. The standard formula calls for 79.7 copper, 9.5 lead, 10 tin, 0.8 phosphorus, and should specify less than ½ per cent impurities as too often scrap metals are compounded to produce this alloy and the resulting trouble is charged to the formula, rather than to the impurities contained. For varying degrees of hardness the lead and tin may be varied between certain well defined limits. The standard formula shows Brinell hardness 60, and compression of 0.25 on a 1-in. cube under 100,000 lb. per sq. in.

Allowable Lead Content

As far back as 1892, Dr. Dudley of the Pennsylvania Railroad, determined the practical limitation of lead content for car bearings, to be in the neighborhood of 15 per cent. While the 15 per cent lead alloys wore more slowly than the phosphor-bronze, this is not conclusive proof that the lead is in itself a wear-retarding element. Lead furnishes the means of allowing the bronze to conform more readily to varying alignment and, by preventing localized pressures, reduces wear. Under the comparatively low pressures and absence of impact, but with the changing alignment of car axles, the 15 per cent lead alloy shows superiority; whereas under high pressures and impact the phosphor-bronze shows slower wear. It is necessary only to compare the pressures of car axles of 325 lb. per sq. in. of projected area, with pressures of 3500 lb. per sq. in. of projected area, encountered in rolling mill practice, to demonstrate why 15 per cent lead alloys are not suitable for the latter condition.

It may be said that the formula which will show the least wear under a given condition is the one possessing the greatest hardness compatible with the required

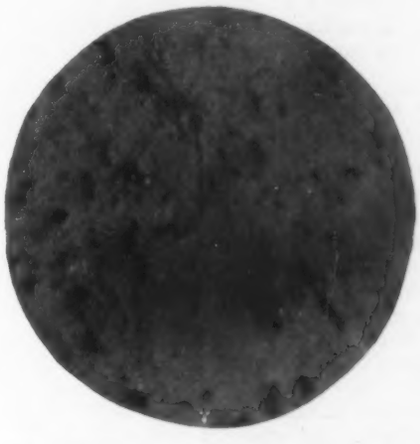


Fig. 4.—Distorted Bearing Bronze, Magnified 100 Diameters. Unetched

plasticity for that condition; qualified, of course, by considerations of sufficient rigidity, lubrication, etc. Unfortunately, we have as yet no manner of predetermining what the limits of plasticity should be for a given condition, so that the proper value of lead must be determined by experience with that service. There is, therefore, no one "best" formula, greatly to the regret of all concerned.

A multitude of mixtures has been suggested and tried. Among the elements sometimes used and in addition to copper, tin and lead, may be mentioned phosphorus, zinc, antimony, sulphur, nickel, arsenic, silicon, tungsten, vanadium, titanium, manganese, aluminum, magnesium, calcium, and boron. In some cases the added elements are used for purposes of deoxidization, while others are added to obtain increased hardness, or otherwise altered structure. No extended discussion can be made of the claims advanced for the use of these elements, except that of these, phosphorus is the most widely used and probably owes its merit to its ability to deoxidize the copper, tin and lead, thus preventing structural weakness.

Troubles Due to Machining

Heavy cuts in machining may seriously injure a bearing bronze. Some years ago trouble was experienced by heating in the driving-wheel bearings in new locomotives of one of the railroads. Chemical analysis of the bronze was made and found satisfactory. When a section was polished and placed under the microscope the condition shown in Fig. 4 was noted at the machined edges; whereas normal structure as in Fig. 5 was found in the interior points. It was then apparent that heavy cuts in machining had actually forced a large part of the lead from the copper-tin sponge, and a rigid structure was the result. It was suggested that ⅛ in. be machined from the bearing journal surface, to eliminate this distorted metal, and after this was done no further heating was experienced.

Some explanation should be made of the lack of suitable bearing testing machines. It is true that some machines have been designed, but their value lies mainly in the testing of the lubricant. It is practically

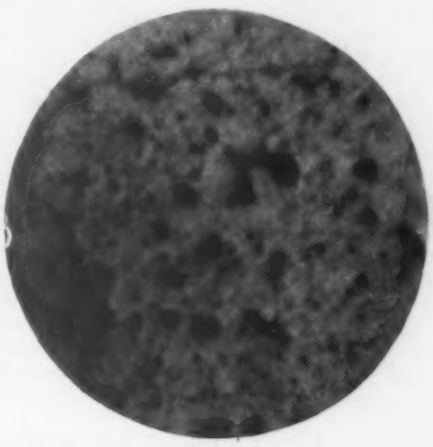


Fig. 5.—Normal Bearing Bronze, Magnified 100 Diameters. Unetched

impossible to duplicate service conditions on the present types of apparatus. With imperfect lubrication, large differences on the same identical test bearing will be noted on different days, and the explanation probably lies in the varying approaches to perfect lubrication obtained.

Tensile and compression tests are sometimes employed to check the uniformity of a given formula, but their extended use is more or less limited by considerations of the expense involved. Analysis is commonly used to check the desired formula, but even this is faulty. The same formula may show large variations in structure caused by different pouring temperatures, or rates of cooling. Structure is obviously the factor which determines the bearing value and, while a microscope may show the arrangement of the elements, it does not measure hardness or plasticity. The Brinell or other hardness value does not give much information as pointed out by the Committee of the American Society of Mechanical Engineers. An instrument designed by this Committee, and now being tried, will give a composite value to three of the five fundamental conceptions of hardness—namely, cutting hardness, scratch hardness, and penetration hardness. Such an instrument may prove valuable in checking bearing alloys for uniformity, but its service in initially selecting the proper formula is questionable. As will be seen from the above, little can be expected at present from inspection tests.

As in many other fields, a reliable manufacturer should be consulted for his experience with similar conditions. When suitable alloys are obtained he should be required to maintain uniformity of properties in the alloys subsequently delivered. It should be pointed out that the use of scrap mixtures is a common source of the varying service obtained in bearings, and that uniform results can be obtained only from alloys composed of new metals, produced with standardized melting and molding practice. Unfortunately, initial price considerations sometimes rule in the purchase of bearing alloys and the final cost per unit of service is much higher than would be the case with a slightly higher initial outlay.

In the discussion of Mr. Frank's paper, Dr. John S. Unger, manager Central Research Bureau, Carnegie

Steel Co., Pittsburgh, stated that it was his belief that the common practice of purchasing bearing metal of either bronze or white metal by analysis is wrong. "I think all bearing metals" he said, "should be purchased on their mechanical and physical properties. Since these properties in the same metal are decidedly influenced by the number of times the metal has been remelted, by the pouring temperature, and the size or volume of the bearing, it is very important to know what can be expected from a bearing poured under the best conditions.

"Bronze bearings are prepared at the foundry, where it is assumed the bearings are cast under the most favorable conditions. When worn out, the scrap bronze is rarely remelted by the consumer, but is returned to the maker to be remelted and refined by such practices and additions as will produce a metal equal to new metal. This places the responsibility on the maker, and his problem is to produce bronze having the best qualities for the purpose intended."

It was Dr. Unger's opinon that soft bearing metals should be purchased on their resistance to compression, their hardness, and their tensile properties, determined at three temperatures, as follows: 60 deg., 212 deg., and 300 deg. Fahr. He pointed out that "in addition, the seller should furnish the melting points and the best pouring temperature for each grade he offers. This information will enable the purchaser to make a selection of metal based on such physical qualities as are best adapted to his use. In many cases two metals will be found having almost the same properties. If the cost be consulted, it will be found that one metal may cost several times as much as another, but, if the cheaper metal is properly poured, the higher priced metal will not have any special properties to justify the extra cost."

Brinell Tests of Babbitt Metals

T. D. Lynch, research engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, presented two illustrations to show briefly some of the results of the hammer tests on babbitt metals, as carried on by the Westinghouse Electric & Mfg. Co. and that were presented in the paper referred to by Mr. Frank. Referring to the Brinell test, Mr. Lynch said: "I would like to state that we have found the Brinell hardness test a most useful one and one that can be used on every kettle of 3000 lb. of babbitt metal made and, knowing the mixture of the material together with this hardness numeral, it is a very safe proposition to use the material having this hardness, other things being equal. This method is being followed by us entirely in connection with the testing of babbitt metals. The sample is made by pouring the metal into a small mold about 2 in. in diameter at the bottom, 2¼ in. at the top and ¾ in. deep. The test is made on the bottom side of this sample and always on the same sized samples so as to get comparative results."

Another matter that must not be lost sight of, Mr. Lynch pointed out, is that of the temperature of the shells before pouring. "We have found it necessary to warm our shells sufficiently to prevent the metal from cooling too quickly when poured into them. The larger the shell the lower the temperature required. The smaller the shell the higher the temperature. If the shell is fairly warm, say 150 deg. C., it helps the metal to flow and we have been able to run the lead-base metal into a shell having a thickness of 1/32 in. or in some cases, even less."

Interesting information on tests of ball bearings versus brass bearings were given by Joseph Slutzker, master mechanic Pennsylvania Railroad, Pittsburgh. A series of tests were run with a ball bearing journal to see how it would compare with brass bearings. It was found that the starting resistances of a train with ball bearings were very much less than the starting resistances of a train of equal weight with brass bearings; but the resistance of the train after getting to a speed of 45 to 50 miles an hour was approximately the same. "We have many trains," he said, "that start at Pittsburgh and make three stops between Pittsburgh and New York, so in view of that fact and the very powerful locomotives that we have, the starting resistance does not amount to much. The ball bearings were run a considerable distance, covering almost two years and much difficulty was encountered with the balls. It was decided, therefore to give up the ball bearing tests and go back to brasses."

Savings Bank Thrift System in Worcester

The Worcester works of the American Steel & Wire Co. has inaugurated the savings bank thrift system which had its origin in Worcester, Mass., and is being taken up by manufacturers of that and other New England cities. The originator was the Crompton & Knowles Loom Works, and besides the American Steel & Wire Co., the Morgan Construction Co. and the Graton & Knight Mfg. Co., all of Worcester, have adopted the plan. The initial canvass of the Worcester Wire works resulted in applications for the opening of accounts by over 20 per cent of the workers, and their total savings annually will be close to $250,000, which is in addition to the nearly $500,000 of United States Steel Corporation preferred stock just subscribed for in the Worcester mills, which also will be paid for on weekly instalments.

At the end of three months the savings bank list will be reopened, and doubtless the number of accounts will be greatly increased at that time, for such was the recent experience of the Crompton & Knowles Co., which after several months of trial received applications from 600 additional workers to join in the thrift plan.

Under this system the company opens an account with a local savings bank, selected by the worker, a bank book being issued, as if the person opened the account for himself, and each week the company deducts the amount named by the employee from his pay, and deposits it, the employee receiving a slip in his pay envelope giving the amount of the account to date. The owner of the bankbook may procure it at any time from the office and withdraw money, or add funds other than those withheld from his wages, returning the book for further use in the weekly saving.

Activity in Motorcycle Industry

The motorcycle industry, Springfield, Mass., is very active. The Hendee Mfg. Co. is operating at capacity, but unable to keep up with incoming business and schedule owing to the recent railroad transportation situation, which held back necessary material and products. The personnel of manufacturing organization is such, however, that it can easily be maintained provided the railroads and express companies do their part.

The Sinclair Motors Corporation, Militor motorcycles, which occupies the old Knox plant on Wilbraham Road, opposite the Hendee plant, held its first annual sales convention, March 22 and 23, at Hotel Bridgeway, Springfield, at which it was officially stated the company hopes to produce 20,000 motorcycles during the next year. At a banquet March 22, George Dunham, vice-president, was the chief speaker, and he and R. L. Nutman, vice-president in charge of the Springfield plant, J. A. Bennett, superintendent, C. G. Miner, chief engineer, N. S. Lincoln, purchasing agent, J. M. Hollett, assistant to the president, and H. A. Goddard, New York, sales manager and toastmaster, gave technical reports on the progress of the company and production, and a general discussion of business conditions, etc. The Wilbraham Road plant was inspected by the 60 distributors and dealers present.

Screw Thread Commission

WASHINGTON, March 30.—The Senate has passed a joint resolution, originating in the House, continuing for two years from March 21, 1920, the life of the National Screw Thread Commission, created by act of July 18, 1918. If this resolution had not been passed by March 20 the commission would have expired by limitation of law. This action makes possible the continuation of the work which has been going on in the question of standardization in co-operation with the Bureau of Standards.

Industrial Engineers in Spring Convention

Discuss Plans for Greater Production with Present Materials, Machinery, Men and Money Through More Scientific Management

AN avoidance of theories and a concentration upon practical results characterized the spring convention of the Society of Industrial Engineers at the Bellevue-Stratford Hotel, Philadelphia, March 24, 25 and 26. The general subject was entitled "The Practical Application of the Principles of Industrial Engineering." As was brought out by one of the speakers, the first elements in industry to receive attention were materials and machinery. To-day the attention of experts is being directed to men and money —in other words, labor and financing. It was chiefly to the element "men" that this meeting was devoted.

The three morning sessions of the convention were occupied by trips to local plants, including the Curtis Publishing Co., the American International Shipbuilding Corporation yards at Hog Island, John Bromley & Sons, Inc., the works of the Baldwin Locomotive Co., and the new plant of the Tabor Mfg. Co., which is unique in being one of the pioneer plants to adopt the famous Taylor system of scientific management.

The afternoons and evenings were devoted to formal papers, followed by informal discussions. The closing event was a banquet Friday night. There were 30 scheduled speakers, who treated the industrial executive, industrial relations, industrial management in army construction, industrial safety and medical work, best types of organizations, the definition of industrial engineering terms, the training of foremen, financing, the study of fatigue, cost systems, team work among engineers, the effect of the industrial engineer on the earning power of industry and means of co-operation between industry and education. About 40 companies maintained exhibits, consisting of pictures and charts, or labor-saving appliances demonstrated at the convention.

New Branch Societies Planned

There was a registration of 1200. At the business session of members a resolution was passed endorsing a national department of public works. Resolutions of sympathy were passed for the families of the late Henry L. Gantt, Montclair, N. J., and Dr. Southard, Harvard Medical School, both of whom were prominent in the field of industrial engineering. New chapters of the society were planned as follows: Philadelphia; some city on the Pacific Coast; for the district embracing southern Ohio and Indiana and located in Dayton, Cincinnati or Indianapolis; for the Southwest, located in Texas. Plans were made for the formation of student chapters of the society in Pennsylvania State College, Massachusetts Institute of Technology, Purdue University and the University of Pennsylvania.

Edward James Cattell, chairman trade expansion committee, Philadelphia Chamber of Commerce, gave the address of welcome in an eloquent and inspiring manner. L. W. Wallace, general manager Red Cross School for the Blind, Baltimore, president of the society, discussed: "What the principles of industrial engineering actually accomplish when applied by the four classes of industrial engineers." The four classes were named: 1. Managing executives, including directors of employment, safety, welfare and medical departments; 2, professional industrial engineers, consultant and resident; 3, technical and accounting engineers; consultant and resident; 4, specialists in industrial economics, including teachers, psychologists, professional labor mediators, publicists, etc. He said that the science of industrial engineering pertained to the securing of production through natural toil rather than from natural advantages or pecuniary profits. He said that both technical knowledge and executive ability were the ideal qualities for an industrial engineer. He emphasized that "mutual service" is better than so-called "welfare work." He pointed out the need for both resident engineer and the consultant engineer, the latter one who brings the fresh outside viewpoint to the industry.

In the absence of Dudley R. Kennedy, industrial counsellor, Philadelphia, who was to have discussed "Executive Direction of Industrial Relations," his paper was read by Richard M. Nieustadt, his business associate. He expressed the conviction that the present industrial unrest was economic and not because of the world war. He said that management has fallen down on the job; that it has forgotten the necessity of loyal co-operation; that it has done too much for the workman and not enough with him. Management has even taken away the workman's name and given him a mere number. Management will have to regain the confidence of the workingman.

Formal discussion was made by Mark M. Jones, Thomas A. Edison, Inc., Orange, N. J. "There must be less repression of the workman, and more expression," he said. One present-day problem of industry is caused by the growth of the holding corporation with its attendant absentee management, where management gets out of touch with actual working conditions. There is a necessity for the development of more individual responsibility. "We don't want any more Governmental regulation of industrial management," asserted the speaker.

Employees' Representation in Colorado Company

E. S. Cowdrick, assistant to the president Colorado Fuel & Iron Co., Denver, took charge of the Wednesday evening meeting. He gave an account of labor conditions in his plant, claiming that the period of probation for the works council is over, having been formed in 1915 and already having paid satisfactory dividends in better efficiency. The plant does not recognize unions, but does not fight them. He described the strike last fall, which lacked the violence and bitterness of strikes of past years, and attributed this better condition to the employees' representation plan. "No doubt the vast majority was against the strike," he stated.

Major Henry Franklin Porter, quartermaster's corps Camp Zachary Taylor, Louisville, spoke on "Application of Principles of Industrial Management to Army Construction." He said that during his three years of army life he had become pleased at the fundamentals of Government operation, though he criticised many details. Though engaged in construction work, he was more familiar with operation and maintenance, he said. He thought that the workmen should have been recruited by selective draft in the same manner as the soldiers. He said there were 902 strikes by construction bodies during the war, 16 per cent of which were to enforce closed shops. He said that labor-saving equipment was installed to save time—not money. He declared that on the whole he favored the "cost plus system" because it did not tie down the operator by red tape.

Psychology Now Applied in Safety Work

"The Dividends Earned by Safety First" was discussed by James M. Woltz, industrial engineer Youngstown Sheet & Tube Co., Youngstown, Ohio. "Psychology has a most interesting bearing on safety," he said. "Only since the war have we applied psychology to safety. We must realize that habits get us, rather than we get habits. Man is naturally lazy, and, thinking that the manner in which he does tasks is the best way, does not exert his mind to invent new ways. Safety work is no longer experimental, and for 13 years has proved practical. Many accidents are brought about because men are employed for jobs for which

they are not fitted. The value of accident statistics is rapidly being realized—they reveal what time of day they are most frequent, at what age a man is most susceptible to make a false move, what nationality is most cautious, etc." The speaker told how the insurance rates for men in the steel industry had been reduced in the last 10 years because of the practice of safety first. He said that the most significant step in the safety movement was the introduction in public schools (such as at St. Louis) of courses in safety instruction.

A. L. Rose, safety director Kelly-Springfield Tire Co., Akron, Ohio, stated that there had been a reduction of accident cost in one year from six to three tenths of a cent. He said that safety should be co-ordinated with welfare work; that there should be much personal contact between safety engineer and workmen in order that the latter might respect him and heartily co-operate with him. He deplored the lack of authority given to safety engineers to carry out their safety ideas and devices.

Physical Examinations of Employees

Dr. R. S. Quinby, service manager Hood Rubber Co., Watertown, Mass., discussed "What the Industrial Medical Department Accomplishes." He said that physical examination of entrants to a plant should not be attempted until the management is sold on the plan and then the executives should be the first to be examined. He emphasized the need for proper propaganda to prepare the way for such examinations. His experience taught him that one in every 1000 refuses to be examined, usually because he is conscious of some hidden physical defect which would disqualify him for his present position. Dental defects are the highest in percentage. In the speaker's experience rejections because of physical disability are from 3 to 4 per cent. A higher percentage might be more desirable from the economic viewpoint. Fifteen per cent of those rejected are capable of some work if properly placed in the plant. Whereas the average industrial worker loses nine days a year because of sickness, this loss was only 0.53 day in the speaker's plant last year.

Dr. Sidney M. McCurdy, chief surgeon Youngstown Sheet & Tube Co., discussed the preceding paper. For nine years he has been a part-time physician in the plant and for the last six years a full-time one. He favors the full-time physician, and instanced a certain camp sheltering 7000, where daily inspection revealed a case of small pox. Speedy isolation prevented its spread. Rejections in his plant from physical imperfection now averages 6 per cent; at one time 4 per cent. For pure efficiency rejections would run about 25 per cent, he said. One benefit of industrial medical departments is the calling attention to the community of the physical condition of its citizens. He said that in steel plants they were better prepared to take care of accidents than purely medical work. The industrial physician has three classes to educate: the public, the employer and the employee.

Dr. Lee Galloway, School of Commerce, New York University, was the first speaker of Thursday afternoon, his topic pertaining to the importance of definitions used by the society of industrial engineers. He said that heretofore 90 per cent of the talk at meetings of this society was involved in straightening out entanglements due to abstract ideas and to the absence of a common language. "We need a working kit of definitions," he said. He suggested that all societies interested in industrial engineering collaborate in formulating standard terms.

C. E. Knoeppel, president of the New York industrial engineering firm of his name, treated "The Most Effective Type of Industrial Organization," his paper later being described by one of the speakers as a classic in the literature on industrial engineering. There was passed through the audience charts showing the similarity of the human body, the perfect organization, to the ideal organization in industry. The first chart showed the human body as an organization in which the function of co-ordination was accomplished by the cerebrum; the function of control by the 12 cranial nerves and the eye, tongue, skin, nose and ear; the function of service by the medulla oblongata and the heart, stomach, lungs, kidneys and liver; the function of performance by the cerebellum and the trunk, arms and hands, legs and feet, mouth and generative organs. Another chart showed industrial organization based on the organization of the human body, in which the function of co-ordination was represented by the stockholders, directors, executive committee and officers; the function of control by the financial men and the management and efficiency staff; the function of service by the distribution, or sales department; the function of performance by the production, or manufacturing department. He described 35 elements common to the body and industrial organization.

F. C. Schwedtman, vice-president National City Bank of New York, was the first speaker, Thursday evening, his topic being "Financing for Stability." He plead for the co-operation of all forces for production, sound investments, analysis of foreign trade and the basic gold standard.

Fatigue Study Reduces Labor Turnover

Due to the sudden calling away of Frank B. Gilbreth, president of the firm of his name at Montclair, N. J., his paper was read by President Wallace, his subject being "Fatigue Study—the First Step in Better Industrial Relations." He advised engineers to join those who had already studied the subject, and thus avoid duplication of effort; a program in the plant for "fatigue day," which has been adopted yearly in many plants, and is the first Monday in December; regular talks by insurance men. He discussed such fatigue-making or eliminating elements as clothing, posture, chairs, work benches, lighting, line of vision, window shades and their color scheme, ventilating and heating. He said that fatigue elimination has a marked influence in reducing labor turnover.

The Matter of Training Foremen

John Calder, manager of industrial relations, Swift & Co., Chicago, spoke on "Training Foremen as Executives." He said that the foreman must be taught to find out just what the workman wants. The workman should be encouraged in self-expression. Too often the foreman does not know how to convey orders. We must restore personality in business through the foremen. The motto of the Swift company is: "Make goods plentiful and men dear." Healthy discontent is a normal American condition—we must strive to eliminate only the unhealthy discontent. The speaker advised against forcing foremen into study clubs; he advised teaching foremen to lead, not drive. The foreman should be trained to develop himself as a man, as a part of the organization and as a handler of his men. Mr. Calder outlined the method of training foremen in his plant. He concluded: "The employer is to-day more liberal than labor; if the latter is not careful it will spill the beans."

Discussion was carried on by D. G. Stanbrough, general superintendent Packard Motor Car Co., Detroit. He found two main faults with the present apprentice system in the metal working trades: It does not produce skilled workmen fast enough; it does not appeal to the rising generation. He said that the pay and training of apprentices must be made attractive for the apprentice system to pay. He told of his company's method of training men; of the co-operation with the Detroit public schools in furnishing equipment; of the training of men on the company's time at 10 o'clock in the morning, the best period of the day.

Cost System Like an X-Ray

The first session of the closing day was opened by William B. Ferguson, assistant to the president, American International Shipbuilding Corporation, Hog Island, who talked on "How the Cost System Assists the Management in the Reduction of Operating Costs." He said that it is necessary for efficient production to not only find out whether the cost of production is higher than for a corresponding period some other year, but to find out where costs have increased and where diminished. Since the installation of a cost system at Hog Island production increased 50 per cent

per man in six months. He concluded: "A cost system is like an educational system—if you have it, you don't notice it; but as soon as you abandon it, you do."

Discussion of the subject was continued by Hasbrouck Haynes, president of the industrial engineer corporation of his name at Chicago. He said that the purpose of a cost system is to furnish intelligence to the management and directors, to form a basis for the fixing of the selling price, to show whether operations are resulting as a profit or loss. He compared a cost system to an X-ray—it points out the mistakes, though does not attempt to remedy them. He mentioned the advantages of associations of manufacturers in the same line where cost figures of members can be compared, making of the associations clearing houses of information.

"Saving the Man by Wearing Out the Machine" was the topic of Walter N. Polakov, industrial engineer, New York. He told of the old idea of harvesting dollars, even if accomplished by restricting output, and the false economics attendant on the practice. He compared laid off machines to laid off men, the former continuing to be carried as overhead, the opposite holding with the latter. He said that in a period of the last eleven years 40 per cent of our blast furnace capacity had been idle 40 per cent of the time, caused in the larger part not by repair work, relinings, etc., but by restriction of output, because of prevailing unattractive prices. The consumer always assumes the loss because of this idleness. He gave several illustrations of where overhead charges were greater than the payroll, many of these being in the steel industry. By eliminating the idleness of plants we won the war, he said, and the same principle should be applied to peace time production and make materials cheap and men dear.

George T. Trundle, Jr., consulting engineer, Cleveland, discussed the subject. He said that before the war we secured a large part of the highly skilled workers from Europe, but many of these were killed in the war.

We must concentrate on the problem of developing high-grade machinists and tool makers for ten years hence to make up for the loss and take care of the natural increase in demand for them.

L. P. Alford, editor *Industrial Management*, New York, spoke of "The Value of Team Work Among Engineers." Professional engineers pay more than $1,000,000 in dues annually to 200 technical societies, but a large share of this money is wasted by duplication of effort. He suggested the sending of a group of engineers to Russia to study the new industrial and civic movement there, and make a comprehensive report for the benefit of the rest of the world. He advised the establishment of a great engineering and industrial headquarters in Washington, similar, for instance, to the headquarters of labor, or the National Association of Manufacturers; also the founding of a group of national museums of industry.

Industrial Engineering Lacks Public Interest

Irving A. Berndt, vice-president C. E. Knoeppel & Co., New York, discussed Mr. Alford's paper. He said the profession of industrial engineers had not sold itself to the public as shown in the industrial conference in Washington last fall when the management side of industry was not represented. He suggested the setting up of standards for membership, caution lest there be too many branches of the society with attendant decentralization. He plead for co-operation in research, education and definition of engineering terms.

At the banquet the first speaker was Harrington Emerson, New York, on "How the Industrial Engineer Increases the Earning Power of Industry." He said that the yearly loss in the United States from inefficient production with means at hand amounts to $250,000,000. He gave many illustrations of cases where the idleness of equipment entailed losses which were needless, such as cars and locomotives which are used on an average of about 10 per cent of the time. A striking example of what industrial engineering can accomplish was the instance of how the cost of making a certain worm gear was reduced from $26 to 2 cents at a cost of $200,000.

Dexter S. Kimball, dean of the College of Engineering, Cornell University, told "How Industry Can Assist the Educator." He said that thus early before graduation representatives of 25 plants have already come to his university to look over promising material among the seniors. "It's because the engineering student has been taught to think straight," he declared. He spoke of the tendency in less conservative schools to change the curricula every time someone had a "happy thought" as to something additional which should be taught, but deplored this fickleness. He asked for greater co-operation with students from industries, asking that the students be given more chances for summer work. "The doors of many industries are closed as tight as a jail to young men," he said. In conclusion he plead for higher ideals in industry, stating that it was this lack which brought Germany down. He hoped that the university would always keep before the people lofty ideals and would always remain a little above and away from industry.

Merger of Drop Forging Companies

Special meetings of the stockholders of J. H. Williams & Co., at Brooklyn, N. Y., and of the Whitman & Barnes Mfg. Co., at Akron, Ohio, have been called for April 2, for the purpose of ratifying an agreement entered into by their respective presidents, made subject to the approval of the stockholders, for the merging of the Chicago, Ill., and St. Catharines, Ont., plants of the Whitman & Barnes company with J. H. Williams & Co. When ratified, this plan will contemplate the operation by J. H. Williams & Co. of drop forging and drop forged tool plants at Brooklyn, Buffalo, and West Pullman, Chicago, in the United States, and at St. Catharines, Ont.

The plans of J. H. Williams & Co. under this arrangement call for a considerably extended business and for the services of all their customers in the location most convenient for them.

The Whitman & Barnes company's Chicago plant includes the new forge shop, 100 ft. x 500 ft., and power house, which has just been built by Stone & Webster at a cost, including complete equipment, of $1,250,000. The company will continue its business of making twist drills, reamers and collateral lines on an extended scale at Akron, Ohio.

Electric Mill Drives

Electric mill drives were discussed by J. D. Wright, P. & M. Engineering Department, General Electric Co., Schenectady, at a recent meeting of the Philadelphia section of the Association of Iron and Steel Electrical Engineers. The paper discusses the general subject of electric mill drives with particular reference to some of the factors which influence the selection of the electrical equipment for driving the main rolls of various types of mills, and illustrates how the layout of the mill and method of rolling the steel affects the load cycle from which the motor capacity, size of flywheel, type of control, etc., are determined.

A copy of the paper can doubtless be had by addressing J. F. Kelly, secretary, Association of Iron and Steel Electrical Engineers, 513 Empire Building, Pittsburgh.

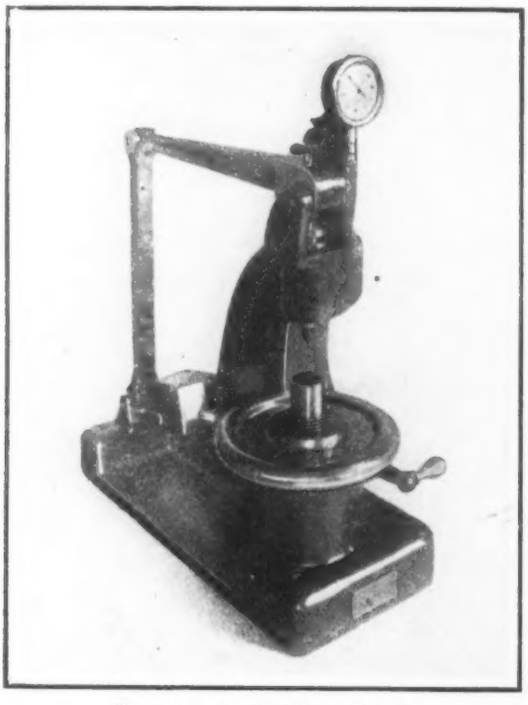
International Chamber of Commerce

WASHINGTON, March 29.—The new International Chamber of Commerce, projected at the International Trade Conference at Atlantic City last October, will be formally organized, it is announced by the Chamber of Commerce of the United States, at Paris during the week of June 21, 1920. Invitations have been sent out by the American group of the international organization committee to business and industrial associations, asking them to name delegates to participate in the organization meeting. About 100 American delegates are expected to attend.

The Rockwell Hardness Tester

A new hardness testing apparatus, called the Rockwell hardness tester, is now available which, it is claimed, will test shapes of various metals which the Brinell and Scleroscope machines cannot and which fits nearly all the hardness testing requirements occurring in manufacturing to-day. A description of the machine, which is put in the market by its inventor, S. P. Rockwell, 122 Dickerson Street, Syracuse, N. Y., is as follows:

A sturdy hollow cast frame, together with a plunger which holds the testing point at one end, abuts against a delicate measuring device at the other end. A series



The Rockwell Hardness Tester

of levers with knife edges connects this plunger with a weight. By shifting the position of this weight, more or less weight can be applied to the testing point at will to suit conditions of the work. Application and release of this weight, called the final weight, is controlled by a hand lever. A vertically movable chuck, notched and flat, holds the work. The chuck is actuated by a hand wheel.

The article to be tested is placed on the chuck, round section in the notch, flat sections on the flat surface. The work is raised on the chuck by the hand wheel till it comes in contact with the testing point. At this moment an initial pressure is applied through the point to the work. This initial pressure is to cause the point to break through the light scale, decarburization, etc., in order to more nearly test the true metal beneath. The upward movement of the work is continued until the plunger has actuated the measuring device to a degree sufficient for testing. The final weight is then applied by the hand lever and released. The hardness is read direct by the difference of the testing point's position indicated by the measuring device. The chuck is then lowered by the hand wheel, the article removed or shifted and another test made. A degree of elasticity of the metal is also determined by noting the measuring device or test point difference from final pressure to initial pressure. The average operator can make six tests per minute. By practice 12 tests can be made.

The greatest value of this machine for shop use is as a comparative tester. The indicating dials as furnished with the regular equipment are of standard form. For comparative work hardness limits are established by Brinell, Scleroscope, file or working tests. The Rockwell hardness tester is then set for the particular class of work to be tested and the Rockwell limits established. According to the customer's desires and at a small additional cost the indicating dials can be calibrated in Brinell or Scleroscope or percentage hardness, using electrolytic iron as zero per cent soft.

New Illuminator for Microscopes

Laboratories of industrial management will be interested in a recent invention of Professor Silverman, head of the school of chemistry of the University of Pittsburgh. It is a new illuminator for microscopes which makes possible a wealth of detail. A clearer picture for the eye is obtained without any images, such as a lamp filament, or other interference. In the examination of metals, paper as well as textiles, more of the actual composition is seen, it is stated, than by the older methods of throwing light on microscopic specimens.

The light itself is a ¼-in. glass tube, bent into the shape of a circle, containing a single tungsten filament. It is supported on the instrument by a patented holder with three iris-like fingers which clamp it to the objective of the microscope. Light is thrown directly down on the specimen being examined, as the lamp is silvered. There is no extra light that would tend to tire the eye.

In connection with the use of the New Eye, as it has been called, a rheostat is necessary for using current from a 110 or 220 volt lighting circuit. By pushing a button switch the lamp is ready for visual examinations. For photographic work, which requires 18 volts, a spring contact is used.

Photomicrographs are taken in much less time, it is emphasized, and show a greater detail than when vertical illuminators are used. But 10 to 40 sec. are required for this work. Eyestrain is minimized. There is no extra light around the object, for it is thrown di-

Complete Equipment Showing the New Illuminator and Rheostat. The insert is a close-up view of the illuminator and its iris-like holder

rectly down on it. The fact that the illuminator is attached to the objective of the microscope and moves with it does away with vibration, should it occur.

Plant No. 3 of the Moline Iron Works, Moline, Ill., erected on the old Three-I League baseball grounds, has been completed and is now in operation. The foundry building is 110 x 400 ft. and the annealing and finishing department building, 110 x 360 ft. The equipment includes two 12-ton melting furnaces and eight 25-ton annealing ovens. The output will be malleable castings for the implement, automotive and washing machine industries, as well as saddlery hardware. In full operation, the new plant will employ 250 men, making the total enrollment for the company between 500 and 600 employees.

The Foreman and Industrial Democracy*

The Movement for Adequate Training of Major and Minor Executives—A Story of Results in Some Notably Successful Classes

BY JOHN CALDER

WE hear much to-day about industrial democracy. What is "industrial democracy?" The phrase, unfortunately, has been virtually copyrighted; it is being conjured with, and, just as happened with the older slogans "scientific management" and "efficiency" it is being identified with packages having a certain label. Now this is somewhat unfortunate, but it is almost inevitable, for it is just the thing that the imitative but unthinking employer is always ready to go out and buy when it is the fashion to do so, but about which he is not prepared to take any personal trouble. Now, I have to tell you that you can't *buy* "industrial democracy"; and if you try to do so, I want to warn you that you can't "wish" it upon your workers with any degree of success.

Industrial democracy is not a plan, a condition, or a theory. It is an aspiration for self-government, for a spirit of comradeship and good-will, and the form it takes is unimportant provided it functions effectively in each particular instance. Various forms of it which ought to succeed, theoretically, fail, more or less because they are not the genuine desire of either employer or employee. They are condescensions from the one side and impositions upon the other and are tolerated as necessary evils by their bestowers and utilized grudgingly by their recipients.

The Industrial Situation To-day

It has been abundantly demonstrated that modern production methods at their best, though calculated through system and equipment to increase individual and national well-being, will not of themselves produce industrial contentment. Economic friction, even in the best ordered industrial families, is the inevitable price we must pay for a democratic basis of existence. Yet the great majority of us are convinced that it is well worth the price, and we should not confuse the present regrettable "lay-off" which labor is taking, with its enduring instincts.

What, in brief, does the workman want, and what must the foreman do in the premises? Well, the workman wants more liberty in industry—a share in the policies of the management, but only in so far as they touch his interests. He wants to be treated as an intelligent participator, not merely as the seller of a commodity. He wants to be consulted, to have some things explained to him, in the first instance, not merely thrown at him or arbitrarily imposed upon him by bulletins, orders or decisions to which he was not a party.

Is there anything unreasonable in that? "Oh," say some employers and executives (still mentally in the last century), "can't we do anything we like with our own things and in our own plant?" The answer is that there is no law yet against trying it, but that if we are wise in our generation we won't attempt to play a lone hand with the interests of others.

What Is the Social Issue?

The real labor problem, as it now presents itself to the people of the United States, is this: Can the Nation's industries be so organized and administered as to bring to the service of industry the well tested principles and ideals of our political democracy, without overturning the foundations of the republic and without destroying the only guarantees on which order, liberty and progress can possibly rest?

I believe they can, and that employers, executives, foremen and workmen, competently informed, energized, sympathetic and keenly desirous of getting at the truth, can co-operate for an adequate national surplus, with as much harmony as is consistent with the healthy discontent with "things as they are," which is the genius of the American people. And that people is just about ready to serve notice on all whom it concerns—labor, labor leaders, employers, legislators, and President—that it has just one great reservation, viz., the right to make its own mistakes.

A highly esteemed captain of industry recently announced that he knew what was best for his workmen, and that he intended they should be so guided. But they also reserve the right to make their own mistakes, and it is useless in our day for employers, however powerful and wise, to aim at and plan for a quite docile organization of human units as some have done. Instead, American and alien alike should be encouraged in self-expression and generously aided to use their self-determination intelligently.

What Is the Remedy?

The remedy is quite old-fashioned and rather out-of date. It is education, a slow but sure one, but capable, in these hustling days, of acceleration with several speeds. "Educate whom, and about what?" you ask.

Educate the employer, the management, the foreman, the workman, the minor, the public, and industrial councils where they exist, in the art of co-operating for an adequate surplus; and we might even, in a sanguine moment, extend the endeavor to Congress.

"Well, well," says some one, "has your mountain of premise brought forth such a ridiculous mouse of conclusion?" It has. But remember, it was a ridiculous mouse which freed the netted lion of the fable.

Have we a program for all of these? Yes, but that is another story. Our concern here is with the foreman, and we will devote the rest of the time to him and to the contribution his effective education will make to industrial progress and harmony.

The Foreman's Qualities and How to Develop Them

There are twelve main qualities needed by our foremen and executives to-day, and they must be developed where weak, and consciously applied to their men individually. Two of the qualities deal with trade skill and knowledge of production methods. They would not be foremen if they did not have the first in some satisfactory degree, and we will not dwell upon the second at this time. The remaining qualities are ten in number: Physique, energy, thoroughness, observation, concentration, judgment, tact, control, fairness, loyalty. We want to expand and illustrate in numerous ways these ten ideas to our foremen, and when they get to reading and studying the texts detailing these things, they will come somewhere near finding out what they have to do to improve themselves and their men.

Some professional engineers, anxious to get down to technical detail without delay, are inclined to pooh-pooh this preliminary educational canter in the essential qualities of good supervisory men, but this is a mistake. The future of your reputation and the fortunes of much of your good advice and good practice lie ultimately in the hands of the man next the man who delivers the goods, namely, the foreman. Yet how seldom do you attempt to capture the suffrage of the foreman, and how often do you use the bludgeon of delegated temporary authority from the directors' room. The failure of industrial counsel has

*An address, somewhat abridged, before the convention of the Society of Industrial Engineers at Philadelphia, March 25, 1920. Mr. Calder, who has had a wide experience in the metal working industries, is now manager of industrial relations for Swift & Co., Chicago.

sometimes been due to neglect of and sometimes expressed contempt for the foremen, in whose hands the fate of his efforts ultimately rested.

Facts and Not Guesswork

To be wise in the right way, we and our foremen have to get the facts correctly through observation, thoroughness, concentration and through scientific methods, not by guessing at them. Then we must add to these our own experience and what we know other people have done that is relevant, and then put them all into our thinking machine for a decision of our very own. It is important that we bring these mental processes clearly before our foremen, and we will find them immensely interested, if we do it in an attractive way.

Tell the foremen the story of Ramsay and argon, of Watt and the steam engine, of Newton and gravitation in Euclidean space. They will show great interest in the recital and in the mental processes and wonderful love of truth which characterized these great men, but they will never tackle the subject except through such an introduction.

Foreman Often Does Not Represent the Management

In some plants we visit we know cases where workmen have a big grudge against their employers, simply on account of the bullying of some foremen or assistant foremen. Some executives and department heads are sore also and not able to concentrate fully on their tasks because they are abused verbally and in other ways by men still higher. Government by fear and espionage is both despicable and futile. This is inexcusable folly. It kills all team work, and it lies at the bottom of a surprising amount of executive soreness and labor unrest which manifests itself usually in extravagant demands, often far removed from the actual causes. An employer is often misrepresented to his workers by his own foremen. We must also remember, in our team work, that the bridge of words between us and the workers is frequently very weak, and that ideas often fail completely to get over. Much of our poor work is due to the fact that the workman does not understand his orders.

One factory I know of kept in its employ, to the wonder of people, a very stupid man, and the explanation given by the manager was that when he had a bulletin or instruction of general interest to issue he always tried it out on this man, and when he was sure he understood it he knew it was perfect. In trying to press this home, I once warned a large group of foremen and executives that the workman instinctively thinks of things he can touch and handle, and not ideas; in the concrete, not in the abstract. Judge my chagrin when an old foreman of yard laborers said afterward: "You done fine; but you never said what proportions of cement, sand and gravel you would use in the concrete."

Restore Personality in Industry

In any industry to-day, if we are going to make a big success, foremen and executives must split up into closely related groups, or we shall not get any real co-operation or team work. We must organize to restore personality in big business, and we can only do it through the foremen. I know such men are not like school boys, adolescents eating up information at nights just because they like it. Some of them are in the t. b. m. (tired business men) class, not out for information after working hours and seeking too little of it during working hours. Well, they will lose that "tired" feeling completely if they adopt our Swift motto, "Make goods plentiful and men dear." It gives a new interest in life and in the job, and that is what our foremen and workmen need above everything to-day.

I saw a dog smell the third rail once. He was full of information in a moment, but he was a dead dog; he died of intensive education, an overdose of fact. Such a fate will not befall any foreman or executive here, I am sure, but if he will concentrate just three or four hours a week on these subjects he will have a thorough working knowledge of what industrial relations mean, how industry is run, and what are the universal production rules and the brainy things which must be done about people and things, no matter what the products of the business are. Such a clear comprehension is much more important than a knowledge of system detail, unrelieved by any perspective.

Training Classes Take in 20,000 Foremen

Twenty thousand foremen in 25 states, 5000 of them with Swift & Co. alone, are all thinking about the same things, studying the same books, asking the same questions, and getting the same benefits as others may obtain if they organize to that end. Technical training will naturally follow, but it should never be mixed in with the fundamentals of organization and leadership in industry. The impatient employer and manager would like to ignore these and get on to production details; but foremen should first be energized with the former, presented attractively, and then they will eagerly assimilate technical details pertaining to their own particular plant.

The ages of the people in these training classes range from 20 to 65 years, and it is found that no man has reached his limit. Women supervisors from office and plant alike are also members and not the least enthusiastic. Not all members, of course, benefit equally, for the native ability of supervisors varies considerably, but every man is able to do something more than he has done, by getting new ideas and new points of view. There is a particular advantage in the mass psychology of the training method outlined. Though all members read their texts and work their problems alone, or at least associated only with their team leader, the 200 to 400 men in any one class derive great advantage from receiving their lectures, asking their public questions, and receiving the answers, in the presence of the big boss, all the executives, and frequently the president and directors of the company. Nothing serves to convince a foreman on the policy of his company about all the things and plans and people in it as to have these policies voiced by the lecturer in the presence of all concerned, with the consent of the responsible owners.

Ultimate Value of Foreman Training

If an associated, enlightened group of foremen anywhere will tackle production problems and production people, as outlined, we venture to say that industrial troubles which are bound to arise will not prove insoluble, industrial good will be restored, and the path of the industrial engineer will be greatly smoothed for the application of his necessary and valuable services. Healthy discontent is the normal American outlook, and all our efforts should be toward eliminating the unhealthy kind, based on untruth, ignorance, suspicion and abuse. No amount of generosity, in wages, profit sharing, leisure and treatment, will restore harmony, if the facts of daily operation and economic truth are ignored.

In concluding this part of our topic, let me say that there is no future for the foreman who has no hope—such as the man who was told by his doctor to give up his whisky or go blind, and who replied, "Well, I think I've seen everything I wanted to see." Equally hopeless is the disloyal foreman, who spreads his disease like the "flu," and the unfair foreman, whose influence is gone with his whole gang the moment he is "caught in the act." We cannot exaggerate the losses to industry daily through the low morale of some of the men whom we put in subordinate authority over others. Foremen are the hired teachers of the producing men in the year 1920, or else they are misnamed and misplaced.

How the Classes are Handled

About two years ago I came to the conclusion that it was neither practicable nor desirable to undertake the training of the foremen through the Government, as was then proposed; that what we ought to do was to gather in one family the executives of each individual plant, the officers, the general manager, treasurer, purchasing agent, heads of departments, and all

foremen and assistants—gather them into one family, get together and study the subject of human engineering—all study it. For this purpose I became director of a course for foremen, planned the texts and scheme, and helped to launch the craft and to pilot it for a little, simply as professional counsel. It now makes regular voyages under the guidance of the Business Training Corporation of New York and Chicago. It has proved quite seaworthy and always reaches port with a valuable cargo. One of its main purposes is to encourage the foreman to see the plant as a whole and the relation of his work to it; also to develop those personal qualities of leadership which he possesses, so that he will be able to secure his results by leading rather than by driving. Thousands of foremen, managers, office heads and promising employees in many industries have already been enrolled, and many have graduated, so that there is nothing experimental in the enterprise of the "boss" going back to school for three months with the "boys." Three to four months is found to be the desirable limit for an energizing study campaign, in the case of people long past adolescence and in whom the reading habit has to be revived and strengthened.

Plant Study Group

In each plant a study group is organized, corresponding to a foremen's club, but it is not done by fiat; it should not be wished upon the men, but should be explained fully and then left for their consideration. As soon as they respond, which they invariably do, if the introduction is skillfully managed, a plan of study covering six unit texts is arranged, each occupying the man for two weeks. He studies it in his spare time and at the end of each unit he is required to solve a practical problem in factory management or plant experience. His solution is carefully examined and graded by an external and wholly independent secretary of the training staff, and the six solutions worked out by him are made the basis of personal teaching and advice.

Each foreman is assumed to have technical competence to begin with, at least to the degree needed on his present job, and he is then trained from three angles: first, as a man; second, as a part of a production organization; third, as a handler of employees. The first phase is based on a very intimate study by the foreman of his own personality. In the second he considers the development of present day industry, its interesting history and the factors in modern large-scale production. Thereafter he studies organization and team work, with many modern examples for his guidance.

He learns modern methods of plant layout and dispatching; the installation of equipment and its operation; the materials and their handling. The purchase, storage and routing of material, the prevention of spoilage and waste, storekeeping and stockkeeping, the making of and keeping of records are all taken up comprehensively. The foreman is also introduced to the essentials of cost-keeping, the distribution of overhead charges, systems of control and similar problems of management. They are illustrated by numerous large wall charts, as it is found that good graphical records reach the foreman more effectively.

Handling of Men Gets Special Emphasis

Naturally the emphasis of the course is on the foreman's relations with those under supervision. Different types of workers and their characteristics are described and methods of handling them suggested. Employees' records and wage systems are explained. The maintenance of discipline, the stimulation of individual effort, the development of pleasant relations are treated in a helpful and sympathetic manner. Improved methods of hiring and firing, and the cost and reduction of labor turnover are explained from the viewpoint of the foreman and his part in the proper handling of these questions. The welfare, health and safety of the employee and the duties and opportunities of the foreman are gone into in detail. Underlying principles of team work, fair dealing and cordial attitudes are developed and emphasized. Examples are drawn from actual experience and applied to local conditions, and in all of this care is taken not to run the detail of system and management into refinements, which no foreman is called upon to practise. That is the stumbling block in some excellent existing professional texts, which discourage the foreman by their difficulty at the very outset, and their appeal to a higher education and understanding than he possesses or is likely to possess.

The Swift & Co. 40 classes range from Boston to Portland, Ore., with 50 to 400 foremen in each class, and about 5000 executives in all. Each class is split up into inner groups of about 15 to 20 men, and for each team a bright, ambitious executive is selected as a team leader. He plays "big brother" to his little group of men, meets with them and with the director at intervals, and in all other ways represents the Swift Industrial Relations Training Division to his group in their studies. Every class meets as a whole once in two weeks at a lecture, and each class meeting concludes with an open forum in which we engage to answer any question which may be put. To date over 1500 questions covering every phase of industrial, economic and social conditions have been asked and answered publicly in the Swift groups, and these give a remarkable cross-section of what is in the mind of the foreman. It is a revealing experience. So many things are there in the form of doubts which you think were long ago solved, and so many as convictions or half beliefs which are inimical to industrial progress and good will. In most plants the men have found the training so interesting and their group meetings so helpful that they have effected permanent organizations or clubs, to continue the benefits of the discussion.

In most cases, without the seed-sowing of the course, a self-perpetuated, self-activating foreman's study club would have been impossible. In some plants, departments which have not been up to the average in safety have shown marked improvement. Where there was a tendency to put aside appliances, to throw machine guards into corners of the shop and to forget rules, a renewed interest in employee welfare has sprung up. Where the trouble was due to an old-time foreman not believing in the "new fangled ideas," his study has made him more appreciative. Where the foreman was inclined to make fun of an employee for going to the first-aid room with a slight wound, he now understands the importance of preventive measures. Throughout many departments, with the better understanding of the policies of the management, mere rules are developing into real safety habits.

What About Collective Bargaining?

In this way some of the uncertainties of the human equation in industry are being discovered and defined. Some of the hazards in industrial relations are being removed. To many of the difficult intangibles the key is being found in the foreman, and his training, as already carried out in a large number of up-to-date plants, seems to offer a solution to many problems of management. Even the bogey of "collective bargaining" will be solved through such means, we believe. Industrial councils and committees, composed of such enlightened foremen, and of representative workmen who enjoy working under them and have asked for representation, might well be given full authority to adjust wages, hours and matters of government touching the employee and his status. Indeed, I can see no reason why we should assume that we know what is good for the worker better than he does himself. I feel that every true American reserves the right to make his own mistakes and detests such paternalism. I can see no reason why either he or his hired spokesman, whether a union official or not, should not have status in such a council when desirous. The risk is negligible if you first insure the existence of economic education. sympathy and enlightenment in the councils, and I should say that anything a worker can secure from such a tribunal he thoroughly deserves.

What Is Ahead?

In conclusion, let me give a word of warning, and also of encouragement to the industrial engineers before me, who more than any others, along with enlightened and energized foremen, can pave the way for the

new industrial day in which large earnings will not justify long hours which leave no time to live, and in which a collective bargaining which is sometimes just a hold-up by one side or the other is replaced by a collective adjustment in which the relation between wages and efficiency is kept as close as possible and the facts are respected.

Happily, we have representative government still, but it is not working hard at present. Yet no one has ever been able in the United States to "fool all of the people" even some of the time—though that was accomplished in Russia with dire consequences.

In this matter of social and industrial betterment, the employer must take the initiative and the most difficult persons to deal with are the extremists on both sides. Though noisy, it is surprising to find how relatively few they are. On the side of labor there seems to be much suspicion of one leader by another, and at present labor politics occupy the foreground to the exclusion of the present necessity for more production to give us larger real wages.

The Handicap of Organization Politics

Yet, radical or conservative, the fact remains that often the recognized labor leaders, of 20 per cent of our workers only, will not make a just concession, not because they do not recognize its justice, but, they tell you frankly, because if they admit labor has been overreaching, they are charged by the men with deserting them and betraying the cause. Not only so, but in acting fairly they unwillingly furnish their rivals in leadership the opportunity to undermine their standing with their fellows. It is a shabby game to be popular in the year of the peace and it is not confined to labor leaders. The bourbon employer with the "open-shop policy," but really strictly closed to any organization man, is often a good second in his own sphere in espionage and repression and intimidation; none the less real because they are legal; and the politician is not far off.

Yet we must say that employers in general to-day are more liberal in their intentions and practice than labor and if the latter does not take a tumble soon it will assuredly "spill the beans"; for we certainly cannot divide more than "all there is," and that is what some foolish people are insisting that we can do, by their demands upon industry.

What are we going to do about it? We do not look for the solution from the White House, Capitol or State House, but from patient continuance in well-doing and persistent education, in season and out of season, about the facts of industry and the folks in it and of co-operation for a surplus. There are theories and plans before us to-day for reconstructing business, industry and society on the assumption that no man will make any sacrifice for liberty or for love but only for gain, and many cynics in office, plant and street and government hold the creed, at least, but it is poor business for the premise is false.

True democracy vigorously denies these assumptions. It banks with confidence on men as givers as well as getters, and it knows that knowledge touched with emotion is always inventive, ingenious, persistent and victorious. There's only one cure for democracy of every type that you don't like, and that is more democracy—a hair from the dog that bit you. Democracy should not be confused with any one political party. It has wonderful powers within itself. The self-expression and self-determination which result from man's being the only animal capable of self-concious modification react in the mass to make democracy self-purifying, self-educating, self-disciplining, and self-perpetuating, and the man who stands in the middle of the Lincoln way is going to be run over. It is this clarity, sanity and humanity that have come into industry and have come to stay. He is foolish and un-American who is afraid of them. Let us provide them liberally for the non-commissioned officers of industry—our foremen. They will spread them to the ranks, if they make men while they make things.

World Copper Consumption and Supplies

The world is using copper at a greater rate than ever before, according to an investigation which has just been completed by the Copper Export Association. John D. Ryan, its president, declared recently that from April 1, 1919, to April 1, 1920, more copper will be used in the United States and abroad than in any other previous year, not excluding the war years.

In issuing a statement in behalf of his association Mr. Ryan declared that negotiations were proceeding for foreign sales, as credits had been arranged, and that the foreign demand for copper was limited only by the credit which could be established by the prospective purchasers. An abstract of his statement follows:

A year ago this month the representatives of the Copper Export Association visited the countries of Europe, excepting the Central Empires and Russia, that are important in the consumption of copper, and made the most accurate possible determinations as to stocks of the metal on hand in the form of raw copper and scrap which was left as a result of the manufacture of munitions. From the most definite figures obtainable, covering the year's business, both production and consumption in this country and the countries of Europe, excluding the Central Empires and Russia, we are now able to determine quite accurately what the consumption was during the year ended with March, 1920, and what is the state of the industry as regards stocks of finished metal on hand, and, further, what is the prospect for the year ahead.

Our committee reported that the stocks on hand in Europe at that time, excluding the Central Empires and Russia, aggregated about 545,000,000 lb. of new copper and 385,000,000 lb. of copper in scrap. This amount included about 70,000,000 lb. of copper belonging to the foreign governments which were then held on this side but have since been exported, and 75,000,000 lb. of Australian copper that had been accumulated by the British Government and left in Australia for lack of shipping during the war, making a total of available stocks in those countries of 930,000,000 lb.

The production of the year outside of the United States refineries was about 450,000,000 lb. and through the United States refineries 1,800,000,000 lb., the stock of copper purchased by producers from the United States Government surplus, 100,000,000 lb., and the copper contents of the Government stocks of scrap in the hands of manufacturers, 150,000,000 lb., making a total of European stocks, world's production and stocks acquired from the Government 3,430,000,000 lb., from which must be deducted an increase in the refinery stocks in the United States of 240,000,000 lb. and the estimated stocks of copper and scrap in Europe, 220,000,000 lb., or a total of 460,000,000 lb., leaving an apparent world's consumption of 2,970,000,000 lb., which is in excess of the production for any year in history, including the war years.

It was further stated that domestic consumption is playing a very important part in the total of to-day, in fact, domestic takings during the past six months were as great as the entire consumption in the world during any previous like period.

Joseph T. Ryerson & Son, of Chicago and New York, and the Camden Iron Works, Camden, N. J., announce a new selling arrangement whereby Joseph T. Ryerson & Son become representatives of the Camden Iron Works in the sale of its hydraulic machinery products. Joseph T. Ryerson & Son have been in business for the past 78 years. The Camden Iron Works is also an old established manufacturing concern.

On April 13 at St. Louis, the St. Louis Shipbuilding Co. will launch the City of Birmingham and City of Tuscaloosa, two of four steel self-propellers intended for the Warrior river, Ala., service. These vessels have capacity of 2000 tons.

The Wilson-Snyder Co., Pittsburgh, which sometime ago bought the plant of the Braddock Mfg. Co., Braddock, Pa., has also bought a site of land, 200 x 110 ft. in Braddock, which the company intends to use later in making additions.

Urge Standardization in Building Industries

Chicago Convention Adopts Program to Reduce Construction Costs—Special Attention Given to Housing Emergency

THE housing problem, which is intimately related to high living costs, industrial unrest, radical political propaganda and degenerating influences on the moral fiber and physical well-being of the population, was one of the main subjects discussed at the first annual meeting of the National Federation of Construction Industries, held at Hotel Sherman, Chicago, March 24, 25 and 26. In the words of Ernest T. Trigg, president of the association, there are 121 families for every 100 available dwellings in this country and a total deficiency of approximately 2,000,000 homes. From 1900 to 1917, he said, an average of 350,000 dwellings were built every year, the average in the last seven years of the period being 430,000. In 1918 only 20,000 new dwellings were constructed and in 1919, 71,000. The housing shortage and its corollary, high rents, constitute one of the principal causes of unrest; consequently a solution of the problem is imperative in the interests of industrial stability and continued prosperity.

THE Federation of Construction Industries, which represents an amalgamation of all parties to building work, including producers, manufacturers, distributors, contractors, architects, engineers, realtors and financiers, has undertaken to discover the answer to this perplexing question of the day despite rising costs and tight money. Although there seems little prospect of an early decline in the cost of materials and labor, the organization believes that much hope lies in the principle of quantity production so successfully applied in some manufacturing fields, notably the automobile industry. As was pointed out by B. F. Affleck, president Universal Portland Cement Co., only quantity output has enabled this country to continue in the ranks of self-supporting nations in the face of a steady decrease in the relative number of producers in our population. Quantity production, therefore, has bearing on the labor supply as well as the housing problem.

Standardization Without Restricting Initative

How will this principle be applied to the construction industries? The federation proposes to work it out through the standardization of materials, building practices and business usage. It is not intended to carry the idea so far as to restrict the exercise of initiative and individuality in architectural design, but it is believed that there is room for greater uniformity in the sizes of materials and the dimensions of component parts of structures. As stated by A. A. Stevenson, vice-president Standard Steel Works Co., Philadelphia, uniformity in the dimensions of doors, window frames, stair-cases, in the spacing of studding and joists, and the height of rooms, would not restrict architectural expression, but would mean economy in construction, limited only by the extent of the application of standardization.

It was also pointed out in the deliberations that standards of size would permit manufacturers to keep their plants operating continuously instead of being forced to produce intermittently according to the flow of specific orders. Engineering, as well as commercial, standards, will be given attention by the association and in this connection the United States Bureau of Standards, the American Society for Testing Materials, the American Engineering Standards Committee, the division of engineering of the National Research Council, the United States Bureau of Mines, and the American Institute of Architects—all of which were represented at the convention—have offered their co-operation.

The federation will work out its standards and other problems of a technical character through a staff council, composed of members of the staffs of the various constituent associations, representing all branches of the construction industry. When questions of national importance are involved, an advisory board of 162 members will furnish the maturity of judgment required to determine the policy of the federation.

Permanent Arbitration Boards Advocated

For administrative purposes the association is divided into 12 district organizations, embracing territories corresponding to those of the federal reserve banks. Each district staff will include a permanent board for the settlement of disputes between members. Speaking before the convention in behalf of these boards, C. V. Kellogg, president Kellogg-Mackay Co., Chicago, stated that commercial arbitration had thus far proved unsatisfactory because each disputant selected an arbitrator favorable to his cause and they a third with the result that settlements were rarely effected on the merits of a case but usually represented a compromise between the two sides. Permanent arbitration boards, composed of responsible men in the construction industry, would insure the impartial treatment of all concerned and would eliminate the delay incident to the selection of arbitrators and their deliberations. The prompt settlement of disputes is of utmost importance as a means of preventing the losses resulting from the holding up of construction already in progress.

Hardly less important than arbitration is the standardization of cost accounting methods, contracts and other elements of business practice. These matters also will be studied by the federation.

One of the great obstacles to construction work at the present time is the fact that the financing cannot be arranged for. Money which formerly found its way into mortgages on dwellings and other buildings, is now diverted to non-taxable investment channels. The federation in its convention passed a resolution urging the enactment of pending legislation designed to encourage the building of homes by providing for the exemption from taxation of the income from mortgages on real estate.

The Federation and Foreign Trade

The federation will also give careful attention to legislation and transportation to the end that it will secure fair and equitable treatment, commensurate with its importance as the organ of the construction industry.

It is pointed out that the components of the industry in the aggregate constitute a group interest producing annually in normal times $3,000,000,000 in permanent taxable wealth, somewhat more than one-quarter of the railroad tonnage of the United States, and employing more workers than any other industry, save agriculture.

Foreign trade will also be promoted by the association and in this connection the report of the Foreign Trade Committee, Dr. J. T. Duryea, Pierce, Butler &

Pierce Mfg. Corporation, chairman, is of interest. Abstracts from the report follow:

The Foreign Trade Division of the National Federation of Construction Industries, the first organization devoting its exclusive attention to foreign trade matters in the construction industry as a whole, was accordingly permanently established as a direct central body to promote international trade in construction machinery and materials as economic conditions and national necessities may determine.

The Foreign Trade Division is working closely with the Bureau of Foreign and Domestic Commerce at Washington, D. C., and with the leading commercial bodies and business men of the United States. It is actively co-operating with the United States Chamber of Commerce, foreign chambers of commerce in the United States and United States Chambers of Commerce abroad. It is also working with the American Manufacturers' Export Association, the National Foreign Trade Council, with the banks, shipping interests, and the great agencies of the world's trade.

Dr. Duryea, chairman of the Foreign Trade Committee, was a member of the Committee on Reconstruction Supplies at the recent International Trade Conference held at Atlantic City, where the Federation had an office for the convenience of the foreign and American delegates. The Foreign Trade Division is now in close touch with the European Finance Committee, of which Harry A. Wheeler, a member of the Federation's Advisory Board, is chairman. The Foreign Trade Division will refer to the construction industries all resolutions and projects of the European Finance Committee which relate to construction matters and will lend its support towards righting the exchange situation. It has also offered its services to the International Chamber of Commerce, now in progress of organization under the chairmanship of John H. Fahey, a member of the Federation's Advisory Board, and has been assured that its co-operation will be of great value.

To date the Federation has confined itself to studying where the markets lie for construction materials, machinery and projects, and what means should be adopted to develop them in the best possible way. It has kept in close touch with the entire situation covering our foreign trade and the status of the industry in the various countries. Representatives of the Federation have met visiting foreign delegates and American business men recently returned from abroad, with whom they have gone thoroughly into conditions affecting the construction inferests in all parts of the world, reports of these conferences being sent to interested members.

In the short period of its existence, the Foreign Trade Division has sent out over eight hundred trade opportunities for construction products, issued reports on conditions affecting the construction industries outside of the United States, has made surveys regarding the practicability of the establishment of factories and branches abroad and has succeeded in interesting American manufacturers in export trade who had not previously done business abroad.

Among the more important projects on which the Federation has worked are: the collection of figures designed to show the desirability of erecting American office buildings in London, England, to be transmitted to large British interests in England, to aid in overcoming the lack of proper office space in the British Isles; the equipment of a slaughter house and sausage factory in Norway; the introduction of modern office buildings in Rio de Janeiro, Brazil; the equipment of a street car system, the sale of American road making and brick making machinery, the building of a tunnel, and the sale of rails and steel products in Colombia, South America; the erection of an engine works in France, and the display of an American model concrete house and equipment in an exposition to be held in Buenos Aires, Argentina. One of the best pieces of work it has accomplished was when it stepped into the breach, at the call of the Bureau of Foreign and Domestic Commerce, and through its direct contact with the industry, enabled the Government of Uruguay to obtain, in our sellers' market, a large amount of construction materials urgently needed on some public works in Uruguay which had to be rushed.

The National Federation of Construction Industries proposes to have investigators and representatives in the commercial centers of the world. These representatives will maintain relations with the ministers of public works and transportation and with large financial and business interests of the countries in which they may be stationed. They will keep these ministers and business men informed of conditions affecting the construction industry in the United States. They will advise members of the Federation of contemplated public and private construction enterprises planned in their territories and will endeavor to make it possible for member firms and corporations in the United States to submit bids on these enterprises and to compete on equal terms with interests from other countries. Through using the Federation's Foreign Trade Service, the manufacturers of the United States will secure constant representation in all branches of the industry, and at the same time distribute the burden of the expense. Furthermore, such representation, with the great strength and soundness of its backing, will be in a position to command the greatest consideration from foreign interests.

Over 15,000,000 Supported by Foreign Trade

Among those who discussed export trade at the convention were O. K. Davis, secretary National Foreign Trade Council; Julean Arnold, for 18 years United State commercial attaché at Pekin, China, and M. Morzycki of the Consulate General of Poland, New York. Mr. Davis said that seven years ago only 15 corporations accounted for 90 per cent of our exports of manufactured products, whereas to-day more than 15,000,000 of our citizens are directly supported by foreign trade. The plant capacity of the country has been greatly expanded and when it again produces in normal volume, there will be a great surplus of output which must be disposed of abroad. There is the alternative, of course, of contracting production to suit domestic needs only, but such a course, in the opinion of Mr. Davis, would put the United States "about a half a hop ahead of the soup house."

To succeed in foreign fields this country must change its mode of thought and adapt itself to new demands. By way of illustration, Mr. Davis cited a recent conversation with an English exporter. This gentleman told him that Great Britain has a big advantage over America in that her population has been habitually in sympathy with foreign trade and her government has habitually fostered it. On the contrary the United States Government has been habitually indifferent and often hostile to the development of exports. Mr. Davis was emphatic in his assurance that there is a large field for American construction enterprises abroad and cited examples of Chicago and New York contractors who had undertaken work in various countries of South America.

China Friendly and Wealthy

Mr. Arnold opened his remarks by stating that the Chinese are by no means conservative nor immune to progressive western ideas. On the contrary, they are singularly receptive to modern ideas and particularly to those emanating from this country to which they are exceedingly friendly. China is wealthy, he said, although this is often not apparent because former corrupt governments made the concealment of wealth a habit among the Chinese. Now, however, this wealth is coming out and modern buildings with first class plumbing, lighting and heating systems are being constructed. There is a big opportunity for American construction industries, he said.

By way of example, he cited the experience of an American acquaintance who visited Shanghai by chance with no business motives in mind. Before he left the city this man took over $8,000,000 in building contracts. It is not true, said Mr. Arnold, that China is a field for cheap goods only. On the contrary, the Chinese habit of "saving face" operates in favor of the purchase of the best. If one Chinese merchant buys new equipment or constructs a new shop, his competitors will do the same to "save their faces." He cited a number of American manufacturers who are selling hundreds of thousands of dollars worth of high-class commodities in China.

Mr. Morzycki devoted most of his address to an exposition of Poland's possibilities as an export country. While it is true that Poland has little money to buy our goods, it has numerous commodities which to offer in exchange. It has 2000 oil wells in Galicia, great resources in potash, lead, zinc, coal, chalk, marble and cement. Next to England it is the greatest producer of high grade woolen fabrics. Much of the linen which formerly sold in this country under the guise of an Irish product originated in Polish factories. Likewise many French toys traveled the route from Warsaw to Paris before they were stamped with the names of Gallic firms. Mr. Morzycki cited the great railroad and highway construction program undertaken by the Poles

as an opportunity for American exports and the exercise of American engineering genius.

The Officers of the Federation

Ernest T. Trigg, vice-president and general manager John Lucas & Co., Inc., paint and varnish manufacturer, Philadelphia, was re-elected president of the federation for the coming year. A. M. Maddock, Thomas Maddock's Sons Co., pottery and earthenware manufacturers, Trenton, N. J., was elected treasurer and John C. Frazee, Philadelphia, secretary. Vice-presidents for the 12 districts of the federation were elected as follows:

1. Boston, F. T. Miller, president F. W. Dodge Co.
2. New York, Dr. J. T. Duryea, Pierce-Butler-Pierce Mfg. Corporation.
3. Philadelphia, Col. J. R. Wiggins, John R. Wiggins, Inc.
4. Cleveland, J. A. Kling, Kelley Island Lime & Transp. Co.
5. Richmond, Gen. R. C. Marshall, Washington, D. C.
6. Atlanta, Col. Sam Tate, Tate Mfg. Co.
7. Chicago, B. F. Affleck, Universal Portland Cement Co.
8. St. Louis, Geo. W. Simmons, Simmons Hardware Co.
9. Minneapolis, L. S. Gillette, Plymouth Investment Co.
10. Kansas City, Walter S. Dickey, W. S. Dickey Clay Products Co.
11. Dallas, J. H. Kirby, National Lumber Manufacturers' Association.
12. San Francisco, John Garland, National Association of Real Estate Boards.

MARKED IMPROVEMENT

Iron and Steel Plants in the Mahoning Valley Approach Normal Output

YOUNGSTOWN, OHIO, March 30.—Reflecting appreciable betterment in fuel shipments are the improving operating schedules in all iron and steel plants, which enter the first week of April on a better tonnage basis than at any time in March. Republic Iron & Steel Co. was able to start Hannah furnace at the Mahoning Valley works March 27, much sooner than was expected when the smelter was banked a week before. The Youngstown Sheet & Tube Co. was also preparing to start one of its four idle stacks early in the week. During the peak of the coal shortage, six of 25 furnaces in the Valley were down, four of the Youngstown Sheet & Tube Co., Hannah of the Republic company and the Thomas stack at Niles of the Carnegie Steel Co., which, however, has been out of blast for over a year. In addition, one of the Republic stacks in the Shenango Valley has been banked. Last week the Youngstown Sheet & Tube Co. started its rod and wire mills, after a suspension of several weeks. Officials report that finishing departments commenced the week of March 29 between 75 and 80 per cent of normal.

Carnegie Operations

The Carnegie Steel Co. reports that all of its mills and furnaces are operating close to normal again. While coal and coke are not as plentiful as desired, supplies are sufficient to maintain the plants and production is up to a satisfactory point. During the illness of I. Lamont Hughes, who has been confined to the hospital for two weeks, suffering from appendicitis, the district plants are in charge of Louis N. McDonald, assistant general superintendent.

Brier Hill Steel Co. is operating on a much improved basis and is trying to catch up with orders. All hot mills at the Haselton works of the Sharon Steel Hoop Co. were in commission this week. Despite the acceleration in schedules, it is certain, however, that much second quarter business will not be rolled until the third quarter. It is the general belief of operating executives that the worst of the coal shortage is past and that shipments will continue to improve from now on.

Cars Coming to the Valley

Traffic managers state that large numbers of empty cars are being routed to the Valley from western and southwestern roads, through intervention of the car commission of the American Railway Association at Washington. An appeal was issued to Senator Atlee Pomerene, of Ohio, for car relief for Middle West industrial centers. Many "bad order" or crippled cars are being routed to the North and East from the West, sent in solid trainloads to repair shops and will help out the available supply for raw materials and finished steel early in the summer. The box car situation is also improving and reports received here indicate that empties are being moved westward in goodly numbers from New England.

In the Shenango Valley, the blooming and bar mills of the Carnegie Steel Co. suspended March 26 because of intermittent fuel supply.

Mills are resorting to the use of crude oil as fuel on a larger scale than in many years. Its high cost, however, in comparison with coal, will prevent its general utilization in the industry until it can be employed on a cheaper basis. Burning of oil, though, has enabled the continuance of operations in departments which otherwise would have been forced to suspend.

Higher Coke Prices Expected

Upward movement in the price of coke is expected to set in early in April, following removal of Government price regulations. Coke prices now range from $7 to $10 a ton and prices ranging up to $12 a ton are considered likely by pig iron makers who derive their fuel supplies from the Connellsville district. The price of coal is also expected to sharply advance and among the price predictions are that slack and run-of-mine will sell at $3 to $3.50, at the mine in the Pittsburgh district. The Government price on these grades has been $2.35 f.o.b. mine. A Valley steel interest has been offered by-product coal at $4.25 a ton, the buyer to option the mine. Advances in coal costs are certain to be followed by higher prices for pig iron, declare makers.

Steel Conditions

Because of reduced output in the past five months, few sheet bookings are being made for second quarter delivery. All makers are well booked. Prices are still puzzling and vary from day to day. One sale was made by a broker during the past 10 days at 6.50c. for blue annealed, the tonnage being purchased a short time before from the mill at 6c. However, sales of blue annealed sheets have been made in the past month as high as 9.50c. Likewise the spread on black and galvanized is equally as broad, sales of black being made as high as 10c. and of galvanized as high as 11c., but in small lots. Belief prevails in sales departments that these figures are not to be accepted as characteristic of the market. It is admitted, though, that the price is certain to continue high as long as sheet bars maintain their present general averages. Some sales of Bessemer bars have been reported at $80 and of open-hearth at $90.

It is expected there will be a substantial improvement in sheet production in April and that by the end of the month makers will be in better position to consider new business, though buyers cannot expect early deliveries. The mills continue to ship sheets of all grades in open cars and livestock cars, where such can be obtained, covering shipments with tar paper.

The leading tinplate producer in the territory continues out of the market, having closed with regular customers for full output for an indefinite period.

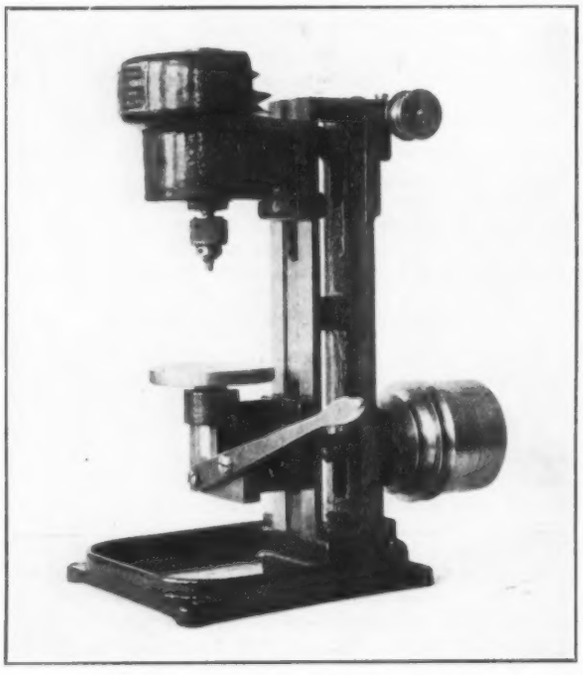
Two new sheet producers, one of which is already in production, are finding no difficulty in booking their rolling schedules, and are picking specifications carefully. One is quoting black sheets at 10c.

Arthur G. McKee & Co., Cleveland, have taken an order from the St. Louis Coke Chemical Co. for a McKee patented revolving distributor for its new furnace at Granite City, Ill. This distributor will be a duplicate of one recently installed by the Weirton Steel Co., Weirton, W. Va., and makes a total of 114 McKee revolving distributors now in service or under contract.

Small Vertical Tapping Machine

A vertical tapping machine for bench use having a capacity from 0 to 3/16-in. taps has been added to its line of tapping machines by the Bicknell-Thomas Co., Greenfield, Mass.

This machine, it is explained, is made with a sensitive friction driving mechanism which enables the operator to tap to the bottom of a hole without danger of breaking the tap. It is equipped with a two-step



This Tapping Machine Is 15 In. High, Weighs 48 Lb. and Takes Taps Up to 3/16-In.

cone pulley for ⅜-in. round belt, and tight and loose pulleys for any speed desired.

The spindle has a reverse speed of twice the tapping speed. The work table is readily operated by the lever shown in the accompanying illustration. If desired, the work table can be removed and a special work holding fixture used. The machine stands 15 in. high and weighs 48 lb. complete.

Will Build a Springfield Plant

Announcement will be made in the immediate future by the Springfield Automatic Screw Machine Corporation, Fitchburg, Mass., of a definite new plant location in Springfield, Mass. Some final details are necessary before the exact location of the new plant can be made public, but these virtually are worked out. Members of the company's official family are Springfield men, including Charles E. Van Norman, president, who also is president and general manager Van Norman Machine Tool Co., Springfield.

The company has outgrown its Fitchburg plant, which employs 400 hands. The management expects to have the new Springfield plant in operation about Aug. 1 next, and to give employment to about 800 unskilled mechanics, whom it proposes to make skilled workmen in time through a liberal employment plan. The new plant should triple the company's output. The Fitchburg plant will be retained for the manufacture of screw machine products, while that in Springfield will be devoted exclusively to the manufacture of automatic screw machines. The Springfield Automatic Screw Machine Corporation has an authorized capitalization of $1,000,000. There are 25,000 shares of common stock of no par value and 10,000 shares of 8 per cent cumulative preferred stock, par $100.

The officers of the corporation are: Charles E. Van Norman, Springfield, president; Frank H. Page, Longmeadow, Lyman M. Waite and Marcus A. Coolidge, Fitchburg, vice-presidents; I. T. MacGregor, Fitchburg, treasurer; Clarence J. Wetsel, Fitchburg, secretary, assistant treasurer and general manager. These men and Ashton L. Carr, Arthur J. Skinner, H. Douglas Williams and Alton F. Tupper, Boston, and Eugene E. Reed, Manchester and Boston, constitute the board of directors. It is not known at present in which Massachusetts city the executive offices of the corporation eventually will be located.

Wire Filter Cloth for Rapid Filtration

A filter cloth with wedge-shaped openings designed to permit a rapid discharge of the filtrate, covered by patent U. S. P. 1,288,504, is manufactured by the Newark Wire Cloth Co., Newark, N. J. This cloth was described in detail in a paper, "Wire Cloth and Its Adaptability to the Chemical Industry," by Alvin Allen Campbell in the *Journal of Industrial and Engineering Chemistry*.

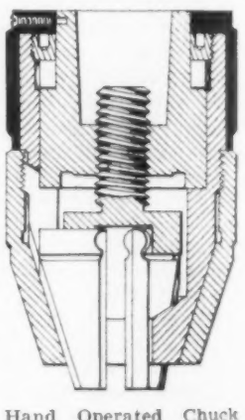
"Microscopic examination of this filtering medium," Mr. Campbell states, "shows an opaque surface when the cloth is parallel with the table of the microscope. If, however, the cloth be turned at an angle of 45 deg. small wedge-shaped openings are seen, the idea being to have the contact surface of the filtering medium a practically tight backing for the quick forming of the cake, the wedge-shaped opening permitting a rapid discharge of the filtrate. When an opening decreases to microscopic size, water, because of its globular nature, must elongate in order to pass through it; if, however, the hole be rectangular, it will pass through more readily, and even better if the opening be wedge-shaped."

Because of the weaving principle employed, it is stated, 500 wires can be put in 1 in. of space, the cloth weighing about 9 ounces to the square foot. This cloth is intended to replace the old type fabric filter cloths, such as jute, hemp, and cotton, and is explained as being more readily cleansed and stronger, and when made of Monel metal or pure nickel, alkali proof and impervious to weak acid solutions.

Hand Operated Chuck

The hand operated chuck shown in the accompanying illustrations is a recent development of the Nielsen-Barton Chuck Co., 106 South Jefferson Street, Chicago. It is intended for use on electric drills, sensitive or high speed drill presses.

A sleeve rotates on the outside of the body and is fastened to the head. By grasping the sleeve with one hand and turning the body with the other, it enables the jaws to grip the drill positively and release readily. The jaws are emphasized as being extra large for so light a chuck and are fitted into the press screw, which is provided with a double thread thus to insure quick and easy movement of the jaws.



Hand Operated Chuck for Use on Electric Drills or Drill Presses

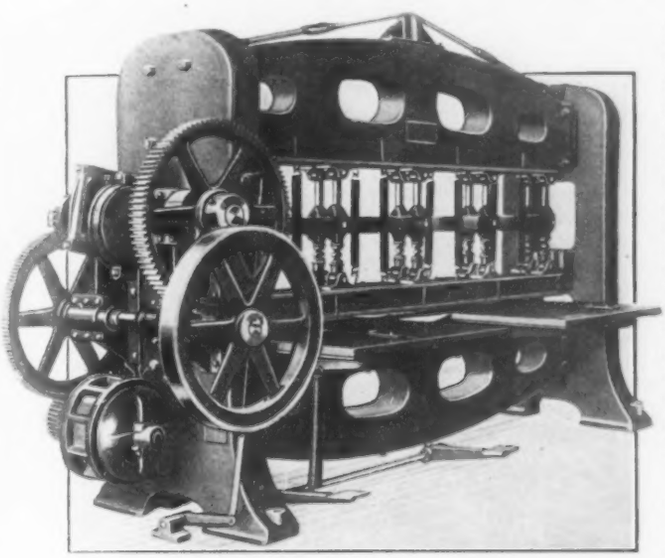
The weight of the ½ in. chuck is given by the manufacturers as 27 ounces.

The United States Civil Service Commission announces open competitive examinations as follows; Mechanician and laboratory assistant, April 28-29, salary $5.25 per day; computer-ordnance, April 28, $7.20 to $12 per day; physicist, $1,400 to $2,800, examination by mail; laboratory assistant, $1,200 to $1,380, examination by mail; associate technologist, $2,000 to $2,800, assistant technologist, $1,400 to $1,800, examinations by mail; junior mechanical engineer, $1,800 to $2,000 a year, examination by mail. Applicants should apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, or the secretary of the United States Civil Service Board at the nearest custom house. Appointees at an annual compensation of $2,500 or less are allowed a temporary increase granted by Congress of $20 a month.

Toggle Type Forming and Roofing Presses

A new toggle type forming and roofing press has been placed on the market by the Streine Tool & Mfg. Co., New Bremen, Ohio. The machine is designed for making all kinds of roofing and special shapes in any length up to 12 ft. and has a large die space which, it is explained, enables the operator to use dies of almost any description.

There are four removable wooden tables which are supplied with gages on both sides of the machine, making it possible to work two kinds of dies in one operation. The dies can be removed either from the side of the machine or from the end. The table arms are of a height so as to bolt gages by removing the wooden tables. The dies are located in the machine



Roofing and Special Shapes Up to 12 Ft. in Length Can Be Handled by This Forming and Roofing Press

by tongue and groove so as to provide alignment at all times.

The forming bar and hold-down bar are balanced with springs. It is emphasized that the toggles and shoes are accurately finished, thus to allow the machine to work smoothly. The press is fitted with machine cut gears and with a positive clutch. The eccentrics are steel and keyed to the eccentric shaft. They are large in diameter and have a wide face, thus providing a large bearing surface.

The machine is also fitted with a box type cam which is keyed to the eccentric shaft. This is explained as making it possible to use a die under the hold-down bar for the forming of light gages of metal.

The presses are made in the following sizes: 8 ft., 10 ft. ,and 12 ft. for 10 gage and lighter; 8 ft., 10 ft., and 12 ft. for 16 gage and lighter.

Trade Mark Laws

A new trademark amendment act has been put into effect in Great Britain. Under the provisions, any trademark which has been actually in use in trading operations for a period of two years, can be registered by the user thereof. In this way, many marks which could not have been registered under the old law, such as geographical terms, surnames and descriptive words, may now be registered.

Many foreign countries require the filing of a certified copy of home registration as a prerequisite of registration in the foreign country. This regulation has prevented the owners of many valuable but unregistered trademarks from obtaining protection in foreign countries.

The National Foreign Trade Council points out that similar legislation is greatly needed in the United States. A large number of trademarks are used by American manufacturers which are incapable of registration under the provisions of the present trademark law; usually because they are either geographical, the mere name of a person or persons not used in a particular or distinctive manner, or words or devices which are descriptive of the goods or of the character or quality of such goods. Many of these marks have, through extensive use and advertising, become extremely valuable. Yet, because they cannot be registered in this country, their owners are not able to register them in countries which require the certified copy of the home registration and are, therefore, open to piratical attacks by dishonest foreign traders.

Recently an attempt was made in Portugal to steal over forty American automobile trademarks. Similar attempts are of frequent occurrence, and can be prevented only by a revision of the U. S. Trademark statutes.

Preparing to Do Extensive Ship Repairing

Active preparations are being made at the Fore River Works of the Bethlehem Shipbuilding Corporation, Quincy, Mass., to embark on an extensive ship repair schedule. Recently 11 milling machines and seven lathes to replaces obsolete machines were placed in the old machine shop, a sizable amount of other equipment is expected to be delivered before long, and the company's new floating dry dock should be completed and in operation sometime this spring. The latter will give the company a big advantage, inasmuch as there are no other fully equipped dry docks north of New York.

The new drydock, 11,000 tons, will be of the floating individual wooden pontoon type, with continuous side swing wing walls of steel, 500 x 130 ft., and capable of lifting ships of a draft up to 24 ft. The pumps are connected by vertical shafts with motors mounted on the deck of the wide swings, and controlled from a headhouse, situated nearby on shore.

In connection with the dry dock there will be a large concrete pier supported by columns resting on bed rock, to which the dock will be fastened. The pier will be provided with a 25-ton traveling hammerhead crane with 100 ft. lift capable of taking care of all repair work.

Beyond this pier there is to be a fitting out berth, where repairs not requiring the use of the floating dry dock will be made. In addition, there will be a wharf to which vessels waiting to go into dock can be moored. New yard tracks and roads will be provided to transport from the storehouse material needed on ships being repaired. These tracks will connect with shops turning out large forgings, castings and machined parts.

The ship repair work program will in no way interfere with the corporation's shipbuilding. The company's dock, built some 18 years ago, is being remodeled, and when completed it will be 180 ft. long and 30 ft. wide at the base.

United Alloy Steel Corporation Addition

The United Alloy Steel Corporation, Canton, Ohio, will enlarge its plant by the addition of a 12-in. Morgan continuous bar mill. This mill will have a 16-in. roughing stand and a 12-in. finishing stand and it will have a rolling capacity of about 10,000 tons per month. It will be installed at plant B and will be somewhat similar to the present 8-in. Morgan continuous mill now being operated by this corporation. The contract with the Morgan Construction Co. includes the mill, heating furnaces, gas producers, cooling beds, shears and other auxiliary equipment. The mill will be of the latest type of Morgan continuous mill and will be electrically operated. The main driving motor will require about 3000 h.p. The buildings to house this mill will be 90 x 680 ft.; 90 x 320 ft. and 75 x 300 ft. The contract for the buildings was placed recently with the American Bridge Co. They will be served by four 10-ton cranes, the contract for which has been placed with the Alliance Machine Co., Alliance Ohio. The mill, complete with buildings and full equipment, will involve the expenditure of about $1,250 000. It is expected that it will be ready for operation in about 15 months.

WOULD REBUILD UNION

Efforts of Agitators to Bring Back Deserters Will Meet Difficulties

Union organizers in the Mahoning Valley are seeking to recruit steel workers who dropped out of the various 24 international organizations represented on the national committee for organizing iron and steel employees, following the disastrous strike last fall. Less than 25 per cent of the men recruited by the committee remained loyal to the organization, it is conservatively estimated. Before being restored to membership, however, they are assessed a fee of $3.

The work of reorganizing these delinquents has been in progress for several weeks and is under direction of J. E. McCadden, district organizer for the American Federation of Labor.

Disgusted by the erratic manner in which the strike was conducted and by the radicals at the head of the movement, many recruits withdrew, and the foreigners in the mills, who constituted the bulk of the new acquisitions, failed to retain their membership because of the utter failure of the movement.

In their organization campaign last fall, leaders of the national committee concentrated their efforts among the foreign-born workmen in the industry and succeeded in inducing large numbers to affiliate with the various locals. They held out golden promises to these men, in some cases going even so far as to assert that they would become owners of the industries. Furthermore they promised more abundant wages, shorter hours and the realization of the millennium in industrial conditions.

When the strike failed the organizers were unable to satisfactorily account to this part of their membership, with the result that hundreds failed to pay their union dues and thus retain their membership. Moreover, the foreigner was never vitally concerned or deeply interested in the union as such, but was moved to join it partly through the selfish motive of personal aggrandisement and partly through coercion and intimidation.

Naturally when the strike failed, these men, never over-enthusiastic in their union affiliation, were among the first to desert the organization.

In the Youngstown district, union leaders either departed or remained passive after the strike and the present recruiting movement, started on a small scale, is the first sign of their renewed activity. In view of the absolute failure of the disturbance last fall, industrial leaders are watching with considerable interest the outcome of the present recruiting and it is predicted that the labor agitators will not build up the shattered ranks of the organizations so easily as they did before.

The Personal Element Important

One of the leading operating executives in the Mahoning Valley, who has worked his way to a position of eminence in the steel industry from a very modest beginning, believes the best practical method of creating a better feeling on the part of employees toward the employer, is through personal contact of department heads with the men. "Workmen are human and want to be treated as human beings and not as cogs in the machinery of a plant," he states. "I always try to keep in mind that steel mills were made for man and not man for steel mills. I worked for years in the mills and I know that workmen like to be treated as partners in industry. One unfair or unscrupulous foreman in a plant can create more mischief and more hard feeling than half a dozen agitators.

"Our welfare department has attempted to make it clear to the employees in our mills that any complaints or grievances they have will be fully investigated and will be treated as confidential. We are not only trying to make working conditions as pleasant as possible, but we are planning to install rest and washrooms and other conveniences which men appreciate.

"We try to have our foremen and department heads know the men working under them by their first names, know how many children they have, if they are married, and something about their home life. We want our employees to feel that we are their best friend and that they can come to us in time of trouble and we will do what we can to help them. I believe much of the discussion relative to creating more harmonious relations between capital and labor is far-fetched, visionary and impractical. The average, two-fisted American workman appreciates nothing better than fair play. Make him feel that he is your partner and not part of your machinery and you will go a long way toward improving labor efficiency in industry."

The executive referred to is easily accessible to any employee in the plant which he manages and has frequently gone out of his way to straighten out difficulties. Workmen have often accosted him on the street and told him of a grievance, or have gone to his home in the evening. He has known many of his employees by their first names and in going through the plant has always accorded a laborer as much consideration as a superintendent or manager. He has won, as a consequence, an enviable reputation as a manager of men.

In the Field of Labor

A total of $2,191,912 was collected as benefits under the Wisconsin workmen's compensation act by injured employes during the past year, according to the eighth annual report of the Industrial Commission of Wisconsin for the fiscal year ended June 30, 1919. This is an increase of 29 per cent over the previous year, although the number of cases settled increased only 4 per cent, and numbered 16,471. The increase, however, was confined entirely to cases involving permanent disability or death, which amounted to 10 per cent of the total number of cases settled.

A conference of foundry operators in Milwaukee and vicinity was held under auspices of the Industrial Commission of Wisconsin on Thursday evening, March 25, for discussion of the new sanitary code as effecting workshops of this character. The code was explained in detail by C. W. Keniston, sanitary engineer of the commission. The outstanding requirement is that foundry owners must install adequate ventilating systems to give employees a constant supply of pure, fresh air.

The Dodge Mfg. Co., Mishawaka, Ind., March 25, distributed a bonus of $150,227 among 3400 employees, covering nine weeks ending Feb. 28, based on 21½ per cent of the earnings of each employee that missed no time during the period and with his work up to the standard.

A works council to have final jurisdiction in cases of grievances of workmen has been organized at the plant of the American Steel Foundries at Granite City, Ill. An election is to be held shortly among the employees of the various departments to select representatives to form the council. All disagreements among employees will be referred to the council for settlement.

The Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., has advanced the wages of employees 10 per cent, becoming effective March 15. The production bonus, varying from 10 to 25 per cent in addition to hourly wages will be operative as heretofore.

The Truscon Steel Co. is offering employees at its Youngstown, Ohio, plants suits, trousers or overcoats at reduced prices. A tailor at the plant takes the measurement of each purchaser and the suit or overcoat is delivered within two weeks. Prices range from $35 up and a $15 deposit is required with each order, balance when delivered. The company claims a saving of $20 to $30 on each suit by this method.

One of the two new blast furnaces built by the Bethlehem Steel Co., Sparrows Point, Md., was blown in on March 23. The second is to be put into operation in about 60 days.

Foundry employees throughout New England have made demands for 90 cents an hour for an 8-hr. day, equivalent to $7.20 a day, effective May 15.

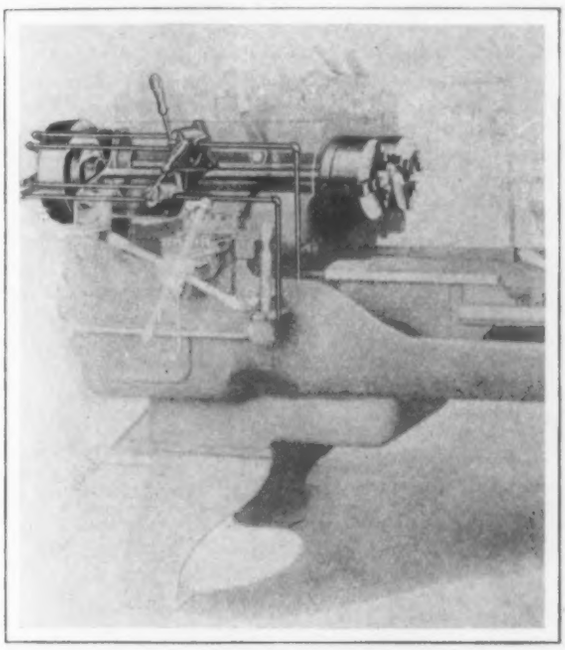
Air-Operated Chucks Applied to Double-Spindle Turret Lathe

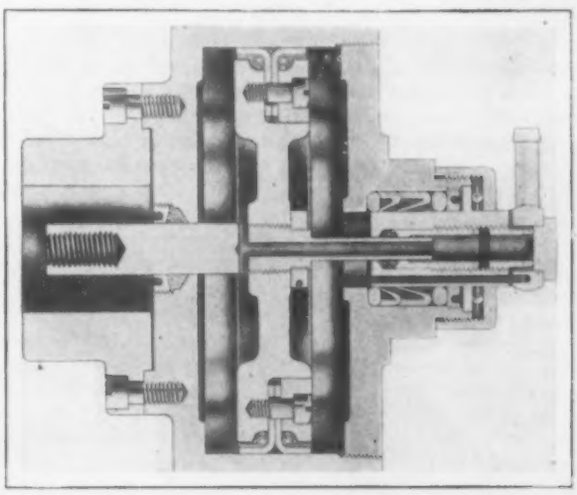
The Logansport Machine Co., Logansport, Ind., in co-operation with the Jones & Lamson Machine Co., Springfield, Vt., has designed air-operated chuck equipment for the double-spindle turret lathe manufactured by the latter company. The application of the Logan chucks to the Jones & Lamson machine has brought out a number of new features not covered in the articles which appeared in these columns on March 27 and May 22, 1919.

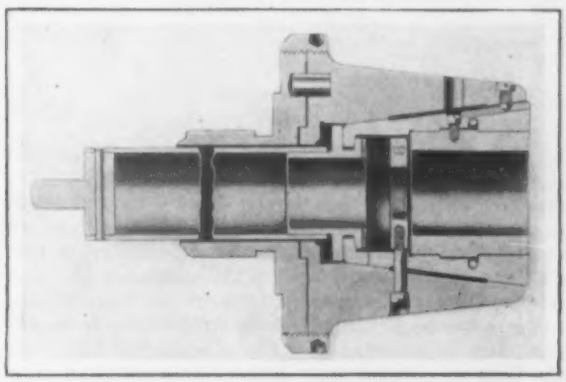
The chucks are drawn directly against the face of the spindles by a right and left hand threaded nut, centering by a counter-bore in the spindle hole and driving by a heavy dowel pin. This design does not require the use of adapters, thus giving maximum strength with fewer parts and reducing the overhang to a minimum.

A compensating collet chuck has been developed which is operated by a hollow draw tube connected with the air cylinder at the other end of the spindle. This arrangement permits the work to extend through the chuck to the end of the draw tube. A further modification of this equipment permits long pieces to extend through the chuck and draw tube and beyond the end of the spindle. This is accomplished by leaving the end of the draw tube open and fitting it with a yoke which is connected by a fulcrum with a non-rotating air cylinder mounted at another point on the end of the lathe.

The construction of the Logan air cylinder has also been altered slightly. The air pipes are now joined to the end of the cylinder in the same lateral plane. This accounts for the fact that only one pipe shows in the illustration of the cylinder. In the old design one pipe was attached to the end of the cylinder and another at a point between the end and the main air chamber. Obviously the new design permits of more compact construction of the cylinder. The Logan air cylinder is termed double acting because one air pipe feeds the section of the air chamber nearest the draw bar by means of a passage through the plunger, whereas the second pipe feeds the other half of the chamber. Through valves and a timing arrangement one pipe is feeding one-half of the air chamber, while the other is carrying exhaust from the other half.







Logan Air-Operated Three-Jaw Universal Chucks and Double-Acting Air Cylinders Adapted to Jones & Lamson Double-Spindle Turret Lathe

The upper right-hand illustration is a sectional view of the double-acting air cylinder, showing compact construction obtained through attaching the air inlet pipes in the same lateral plane

The lower illustration shows a modified Logan compensating collet chuck, with provision for the insertion of work to the end of the draw tube

In distinguishing between the revolving and stationary types of air cylinders, it is well to point out that the former does not rotate in its entirety. The jacket to which the air pipes are attached is stationary, the plunger revolving in it and the exterior of the air cylinder around it.

The chucks are made in numerous sizes to suit a wide range of work. The combination and universal chucks are manufactured in both two and three-jaw types. The leverage of the jaws is in a ratio of 2½ to 1 to the pulling power of the piston. Taking for example an air cylinder with an 8-in. bore, with a capacity at 80 lb. pressure of 4021 lb., the pressure of the chuck jaws on the work would be 10,052 lb., less friction, or approximately five tons. Provision is made in the draw tubes for a bushing to support boring bars, a clearance being provided for the travel of the boring bar pilot.

The Frank G. Payson Co., 9 South Clinton Street, Chicago, is the selling agent.

The Logan air cylinder is made in the following sizes:

Diameter of Bore, In.	Outside Diameter, In.	Stroke of Piston, In.	Consumption* Free Air.	Capacity at 60 Lb. Pressure, Lb.	Capacity at 80 Lb. Pressure, Lb.
3	3¾	1	0.0265	424	565
4½	5⅜	1	0.0594	954	1,272
6	6⅞	1	0.105	1,694	2,261
8	8⅞	1¼	0.234	3,015	4,021
10	11	1¼	0.366	4,712	6,283
12	13⅛	1½	0.633	6,786	9,048
14	15⅛	1½	0.864	9,236	12,315
16	17⅛	1½	1.127	12,063	16,084

*Expressed in cu. ft. per operation at 80 lb. pressure.

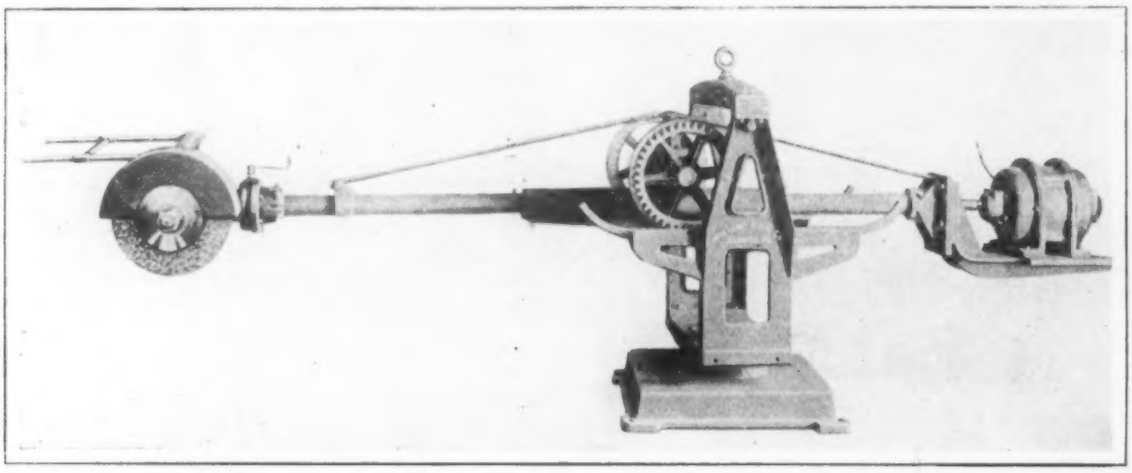
A bridge building plan by the State of Indiana calls for bridges which will cost approximately $250,000 and calling for about 500 tons of steel.

Portable Radial Grinder

A portable radial grinder intended for heavy duty is a recent product of the Mummert-Dixon Co., Hanover, Pa. The machine has a grinding wheel capacity of 20 in. diameter and 3 in. face. The drive is from a 7½-hp. motor running at 1200 r.p.m., and the speed of the wheel arbor is 1000 r.p.m.

The grinder is self contained. By turning a crank handle which engages a worm wheel, the head may by turned through a complete circle and held at any angle. This is emphasized as a feature as it relieves the workman from holding the wheel at the working angle. The trunnion connected with the frame and turning in the base is supported on balls, thus to make the radial movement easy. The grinding head is fitted with ball bearings and the trolley cross shaft is also mounted with ball bearings. Large track wheels are provided to facilitate the travel on the track.

The steel bevel gears have a ratio of 5 to 6 and are inclosed in an oil tight gear case which is packed with transmission grease. All moving parts, except the lower working half of the grinding wheel, are incased. The head and motor come to a horizontal poise when released by the workman due to the weight being suspended beneath the center of the cross trolley shaft. When carrying the machine with a crane, the cross trolley is held in a central position on the frame track by a lock pin in the frame which engages the teeth of one of the trolley wheels.



The Head of This Radial Grinder Can Be Turned Through a Complete Circle and Held at Any Angle

The motor mounting is such that it can be readily adjusted to any type or style of motor. The motor controlling apparatus may be mounted on the side of the frame but on account of its being rather cumbersome, it is usually mounted on the wall or a post nearby.

The length of the arm from trolley to head is 7 ft. and the travel of the trolley is 36 in. The annular working area is 36 in. wide, mean radius 6 to 8 ft. The vertical movement of the head is from the floor to the height of a man. The overall length is 13 ft., overall height 5 ft., and weight with motor 2600 lb.

New Warehouse at Seattle

Expansion of the business of A. M. Castle & Co., Seattle, Wash., warehousemen and distributors of finished steel products, has resulted in the purchase of a 5.65 acre site in the industrial addition of that city, and the company announces that it will soon erect a warehouse and office building to occupy 2.5 acres of the site. The Washington company is controlled in ownership by the principal stockholders of A. M. Castle & Co., Chicago, W. B. Simpson of Chicago being president of both companies.

A. M. Castle & Co. of Washington were organized in 1918 and purchased the plant and business of the Western Hardware & Metal Co., Seattle. The business has increased so rapidly that the present quarters are inadequate. The Washington company is exclusive Pacific Northwest sales agent for the following mills: Lukens Steel Co., Champion Rivet Co., Reading Iron Co., Union Drawn Steel Co., American Rolling Mill Co., Alan Wood Iron & Steel Co., Lennox Throatless Shear Co., C. G. Hussey & Co., Standard Tool Co., McKeesport Tin Plate Co., the Randolph-Clowes Co., and others.

President Simpson announces that, on completion of the new building, stocks will be materially increased and modern machinery installed for fabrication of steel products.

Hand and Motor Operated Portable Elevator

A combined hand and motor operated portable elevator for elevating cases, bales, barrels, etc., for piling purposes is announced by the Revolvator Co., 336 Garfield Avenue, Jersey City, N. J.

The machine is similar in construction to hand operated and motor operated portable elevators. It is equipped with a hand crank for hand operation and in addition with a small motor with cord and plug which may be conveniently attached to an ordinary Edison lamp socket. The motor can be thrown directly on the line without the use of a starting box and is controlled by a knife switch mounted on the elevator. It is explained that the change from one form of operation to the other may be instantly effected. The manufacturer states that when operating by motor a load as heavy as 1800 lb. may be raised at approximately three times the speed attained by the average man operating by hand.

The elevator is known as a combination revolvator and may be furnished with any one of three types of bases—revolvable, non-revolvable, or open end for use in connection with skids. The motor attachment may be furnished for application to hand-operated portable elevators.

Trahern Pump Co. Merger

The Trahern Pump Co. announces that it will not lose its individuality through a recent merger with the George D. Roper Corporation and that all correspondence addressed to the Trahern company should be addressed to the George D. Roper Corporation, Trahern Pump Division, Rockford, Ill. The Roper interests consolidated were the Trahern Pump Co., Eclipse Gas Stove Co., American Foundry Co., and the Rockford Vitreous Enamel Mfg. Co., the purpose of the consolidation being to facilitate the control of the various enterprises by bringing the executive and production forces of all the firms into one organization and under one roof, thus to effect a saving throughout the organization and to accomplish an increase in production for each individual enterprise estimated at from 50 to 65 per cent. Work is rapidly progressing in housing the corporation in its new plant now being erected on a tract of 50 acres at an approximate cost of $1,500,000.

TUNGSTEN BILL REPORTED

Senate Finance Committee Takes Favorable Action on House Measure

WASHINGTON, March 30.—After making some amendments, the Senate Finance Committee has reported favorably to the Senate the House bill imposing a duty on imports of tungsten as a means of protecting the domestic industry established during the war. The bill provides that during a period of three years there shall be levied a duty of $9 per unit of tungstic trioxide upon imports of tungsten-bearing ores and concentrates. A unit is defined as 1 per cent of a short ton of 2000 lb., namely, 20 lb. of tungstic trioxide. The duty fixed in the original bill was $10, and the three-year limitation was not included. The bill also fixes the duty of metallic tungsten, tungsten powder, ferrotungsten, ferrotungsten powder, scrap steel containing tungsten fit only to be remanufactured, commercial tungstic acid, calcium tungstate, sodium tungstate, and all other salts of tungsten and other manufactured materials containing tungsten, except high-speed tungsten steel, and all alloy steels containing tungsten, nine-tenths of 1c. per pound of each of said substances or materials for each per centum, or fraction thereof, of tungsten contained therein. This is a marked decrease, as the original bill provided for a duty of $1 per pound for tungsten.

As a result of the representations of steel men, the committee added a duty of 35 per cent ad valorem for high-speed tungsten steel and all alloy steels containing tungsten.

Republic Improvements at Niles

The Republic Iron & Steel Co. will spend in excess of $2,000,000 this year for additions to its DeForest works at Niles, Ohio. Eight hot and six cold mills, a galvanizing plant and pickling plant will be installed. The corporation will also spend about $100,000 on a plant for recovery of copperas, a by-product largely wasted by many mills, and for which there is a growing commercial demand since the war. Contracts for buildings and equipment have been awarded and the work will proceed under direction of the company's engineering staff. The additions will occupy six and one-half acres. The company has acquired large holdings adjacent in anticipation of future extensions, which will consist principally of finishing units.

Modern ideas of construction will be carried out in erection of the new sheet mills and include water-cooled floors and water-cooled furnace fronts to mitigate the heat. The eight hot mills will be electrically driven, in two units, with one large motor for each block of four mills. For its employees the company will erect a lavatory building where the men may change their clothing on entering or leaving the plant.

The enlarged plant will produce black, blue and galvanized sheets. Later the company intends to enter the manufacture of highly finished sheets for which there is a growing demand. It is expected the additions will be ready for production before the year is over.

Court Upholds Open Shop

The Massachusetts Supreme Court recently ordered a permanent injunction issued against the local photo-engravers' and international unions restraining them from interfering with the business of two Boston engraving companies against which a strike has been directed many weeks.

The ruling of the court, therefore, upholds the open shop. The question for decision, the court said, is whether by concerted action, using the strike as a mass weapon, the defendants can lawfully compel the plaintiffs to yield to their demands for closed shops. The court further said that the right of the plaintiffs at all times to hire in the open market such workmen as they choose, unhampered by the interference of the union acting as a body through the instrumentality of a strike, boycott or blacklist, is a primary right which never has been abrogated.

Coal Tie-up Threatens

CHICAGO, March 27.—Frank Farrington, president United Mine Workers of Illinois, predicts a suspension of work in the Illinois coal mines on April 1. "Our agreement," he said, "expires at midnight March 31, and it will be impossible to keep the men at work after that."

When President Wilson ordered Government control of the bituminous coal prices to end April 1, he recommended that the joint conference of miners and operators settle the wage dispute on the basis of the report of the majority of his late coal commission, which favored an increase of 13 per cent in the pay of the miners in addition to the 14 per cent granted at the time of the strike settlement, sundry small concessions and an eight-hour day. As the leaders of the miners are known to be dissatisfied with this majority report, the President's recommendation may prove insufficient to prevent attempts to force additional concessions from the operators.

Harrisburg Foundry & Machine Works Changes

Christian W. Lynch, of Harrisburg, was re-elected president of the Harrisburg Foundry & Machine Works, Harrisburg, Pa., at the annual meeting last week, when a number of important changes in the directorate were announced. The entire board of directors now includes Alfred Sohland, Henry Danziger, Max Huni and Robert Conrad, New York; W. P. Mackenzie, Philadelphia, and William Jennings and Christian W. Lynch, Harrisburg. The other officers elected at the annual meeting, in addition to Mr. Lynch, were Robert C. Taylor, New York, treasurer; B. E. Taylor, Harrisburg, secretary and assistant treasurer; W. A. Turner, Syracuse, was appointed production manager, and Homer A. Tiffany, Paterson, N. J., consulting engineer. MR. TIFFANY is well known in silk manufacturing circles and the plant will soon engage in the manufacturing of silk manufacturing machinery on a large scale, it is reported.

New Specifications for Track Fastenings

The American Railway Engineering Association in its recent annual convention at Chicago adopted new specifications for steel tie plates, wrought-iron tie plates, malleable iron tie plates, ordinary track spikes and screw spikes. The Bessemer steel tie plates, under the new requirements, will not run over 0.10 per cent phosphorus and not under 0.08 per cent carbon in soft grades nor under 0.12 per cent for medium grades. Open-hearth tie plates shall not exceed 0.05 per cent phosphorus and shall contain not less than 0.15 per cent carbon for soft grades nor 0.20 per cent for medium grades. The tensile properties of the steel and iron tie plates are to be as follows:

Steel Tie Plates

Tensile strength, lb. per sq. in.	60,000
Yield point, lb. per sq. in.	0.5 tensile strength
Elongation in 2 in., per cent	20

Wrought-Iron Tie Plates

Tensile strength, lb. per sq. in.	48,000
Yield point, lb. per sq. in.	0.6 tensile strength
Elongation in 2 in., per cent	28
Elongation in 8 in., per cent	25
Reduction in area, per cent	37

Malleable Iron Tie Plates

Tensile strength, lb. per sq. in.	45,000
Elongation in 2 in., per cent	7.5

Bids on Steel Rails

WASHINGTON, March 30.—The director of sales of the War Department announces that bids for 62,490 tons of surplus type B steel rails described in last week's issue of THE IRON AGE, page 903, will be received until 3 o'clock, April 26, by the chief of engineers, Munitions building, Washington.

The Pittsburgh Locomotive Power Reverse Gear Co., Pittsburgh, will make application for a charter on April 5. The company will engage in the manufacture of mechanical appliances and accessories for railroad use, and power reversing mechanism for locomotives.

ESTABLISHED 1855

THE IRON AGE

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Stabilizing the Coal Industry

The majority members of the President's coal commission see clearly that a satisfactory settlement of the wage controversy between operators and miners does not consist merely of a wage settlement that is acceptable for a time. Henry M. Robinson, chairman and representative of the public, and Rembrandt Peale, representative of the operators, emphasize the fact that the real solution of the coal question lies in measures which will insure evenness of production and distribution. The report points out that the heavy buying movement of bituminous coal comes in the fall and winter, and that inevitably there is a car shortage during the movement, which limits production of coal and interferes with the operation of many industries.

"The solution of the problem," says the report, "is to bring about evenness of production and distribution. This can be done by the co-operation of the railroads, public utilities and steel companies as consumers on the one side, and of the operators, the Interstate Commerce Commission, the banks, and the Federal Reserve system on the other side." The two commissioners are firmly of the opinion that if virtually complete co-operation is assured, it will result in time in a substantially even production, continuous employment and even distribution throughout the year, but until this is done costs will be high and many conditions unsatisfactory. With regular and even production, prices will be more reasonable, employment more continuous, and many industries better stabilized, while waste to a large extent would be eliminated.

The part which can be played by the steel companies is commented upon in the report. It is stated that the commissioners have discussed the problem with the heads of important steel concerns, including the United States Steel Corporation, and that they have expressed an intention of increasing the storage of coal and its movement in the months of the spring and summer. It is also suggested that much could be done by public officials using their influence to have public utility companies and other public consumers co-operate in buying coal during the summer. All of this is in a way of useful suggestion, and it should be carried still further by educating people in general who are coal consumers to follow the policy outlined for the large companies and public utilities. Without question buyers of steam and domestic coals, by adopting the measures now urged, will contribute largely to the making and keeping of peace between miners and operators.

One feature of the minority report, that of John P. White, representing the miners, shows the persistence with which claims for overtime will be urged on a false basis. Mr. White says that "closely associated with the request for a shorter working day, whether that be six, seven or eight hours, is a request for punitive overtime," which he declares "is recognized generally as the accepted means of securing strict adherence to the standard working day." Of course, it is not true that the provision for overtime is intended by the unions as a punitive measure to insure a genuine short day. That was the theory advanced by certain college professors and some other visionary people as the reason for granting the eight-hour day, for, it was urged, with the shorter hours there would be eight hours for sleep, eight hours for work, and eight hours for pleasure. This sounded very well, but the overtime has been consistently and persistently used merely as a means of increasing wages. It is surprising, therefore, that Mr. White should speak of this recent demand for short hours as one for punitive overtime, although it is true of miners more than of other workers that they wish a shorter day rather than entire suspension of activity during many days, as has often been the practice in past years.

In other parts of his report Mr. White talks about the living wage, and everyone wants the miners to have a living wage. It is also the desire of all fair-minded men that the work of the miners be made as regular as possible, but it is not the purpose to grant extravagant wages under the guise of punitive overtime.

The increase in the output of steel ingots other than open-hearth and Bessemer has been marked in the last twelve to fourteen months. According to the statistics of the American Iron and Steel

Institute for February, which showed a steel ingot production at the rate of over 44,000,000 gross tons per year, the output designated as "all other" was 4.49 per cent of the total, while it was only 2.16 per cent in February one year ago. This percentage, which is made up in part of crucible steel but chiefly of electric steel, figures out 15,288 tons for February, as against only 6952 tons in February, 1919. While there is thus shown a marked recovery in the output of electric steel in the last year the present rate of about 15,000 tons per month for crucible and electric steel contrasts with 43,000 tons per month for electric steel alone in 1918, the record year for the electric furnace. While the present rate is about double that of the early months of 1919, it is evident that the consumption of electric steel in the uses of peace must undergo a very considerable expansion before anything like the war-time records will figure again in the statistics.

The Manganese Supply

The country's imports of manganese ore in February were at the lowest rate since early 1915—only 4100 gross tons, against 21,463 tons in January and a monthly average of 27,780 tons in 1919. Shipping difficulties, due in part to interruption of fuel supply, almost cut off the receipt of Brazilian ore in February. This condition prevailed also over a part of March. While it is not known what stocks of imported ores are held by the leading domestic producer of ferromanganese, it is evident that these stocks have been drawn upon in the past year, importations showing a progressive decline. For 1919 they were 333,000 tons; in 1918, 491,000 tons, and in 1917, 629,000 tons. Furthermore, domestic ores supplemented the foreign supply in war time, under the stimulus of high prices, whereas comparatively little is being mined in the United States at present. Cuba has contributed in only a limited way, the receipts in 1919 from that source being about 35,000 tons.

India was a source of supply to this country in some pre-war years, but little can be expected from that quarter this year. On a contract recently closed in New York for 18,000 tons of Indian manganese, shipments do not begin until July and twelve months will be required for their completion. Furthermore, British producers of ferromanganese have been disappointed in their receipts of Indian ores. Some of them who have made considerable sales of ferromanganese in this country have sent word that they will not be able to ship according to schedule because of the ore shortage.

The domestic output of ferromanganese in January was 18,000 tons and in February, 16,280 tons, which compares with a monthly average of 14,900 tons last year. But steel production is now from 20 to 25 per cent greater than in 1919, and likely to increase further, so that it would appear that a manganese scarcity is developing, without an immediate prospect of substantial relief. Domestic mines, in view of the discouraging market of the past 18 months, are not at all likely to take up the role of stop-gap.

If the present rate of steel ingot production is maintained, and it represents about 44,000,000 tons per year, the manganese problem with some producers of steel may become quite as pressing as in war time. Ferromanganese for early delivery is now commanding at least $230 at Atlantic seaboard, which while well below the high record of $450 in war time, reflects very different conditions from those which gave rise to a price of $38 in peace time six years ago.

Again, Cooperation

Taking as its text the conflict and confusion in the metropolitan area and tributary districts in New Jersey and Connecticut, due to the moving forward of clocks one hour on March 28, in compliance with the New York State daylight saving law, the New York *Sun* writes a lesson on cooperation as the thing the people of the United States need to-day more than anything else. It says truly:

> Only by cooperation can the national housing problem be solved.
>
> Only by cooperation can the national transportation problem be solved.
>
> Only by cooperation can the national problem of control of alcoholic drink be solved.
>
> Only by cooperation can the national problem arising from violent and illegal attacks on republican institutions be solved.
>
> Only by cooperation can the problems of too little production on farms, from mines, in factories be solved.
>
> Only by cooperation can the grave national political problems which press on us be solved.

Seeking for the same end as the writer of the above, THE IRON AGE has referred repeatedly to the need of increasing the supply of good will in the handling of the now uppermost problem of human relations in industry. New point is given to all we have written on this subject and to what is quoted above, by the address of John Calder last week at Philadelphia before the national convention of the Industrial Engineers of America. Mr. Calder's work for nearly two years has been directed by the conviction that in the training of foremen lies by all odds the largest promise of results in a better understanding between owners and workers. What he gives on other pages of this issue is not theory, but a record of experience and of amply warranted deduction from that experience—all worthy not only of being read and pondered upon but of becoming the basis of a program in many industries.

Steel Producing Capacity

The monthly report of the American Iron and Steel Institute on the production of steel ingots in February indicated so large an output that fresh estimates may have to be made of the steel producing capacity of the United States. The report showed an output in February of 2,865,124 gross tons, by 30 companies which in 1918 made 84.03 per cent of the total output. Allowing for the production of companies not reporting, and considering the number of working days in the month and year this would indicate a rate of production for the whole industry during February of about 44,200,000 tons a year. Estimates gen-

erally accepted of late as to actual commercial capacity under reasonably fair working conditions have been 49,000,000 or 50,000,000 tons. In February, however, nearly all the works were under great handicaps, and the trade was disposed to hold that the plants on the whole did not produce at more than 80 per cent of their capacity. If February production was 80 per cent of capacity, then the capacity is slightly more than 55,000,000 tons.

An estimate of 50,000,000 tons as capacity, however, rests upon some substantial grounds. The latest test year of actual production under fair conditions is 1916. In 1917 and 1918 there were very serious difficulties, and while all the works did the best they could no one could assert that the output as a whole was anywhere near the real capacity, given ordinary conditions such as the trade was accustomed to before the war. In 1916 operating conditions were approximately as favorable as can ordinarily be expected. There were some traffic difficulties late in the year, but the effect upon the whole year's operation was small. One would expect the present capacity to be the 1916 production plus an allowance for additional capacity by way of new construction. The output of steel ingots in 1916 was 41,401,917 tons. The new construction, as summarized in the annual review numbers of THE IRON AGE has been as follows:

During	Gross Tons
1916	4,205,000
1917	4,326,500
1918	1,945,000
1919	625,000
Total	11,101,500

One may assume that the new equipment completed during 1916 contributed one-half to the year's output, hence 2,102,500 tons should be deducted from the above total, leaving 9,000,000 tons. Added to 41,400,000 tons, the 1916 output, this would give 50,400,000 tons. It is not fair, however, to take the new plants at their ratings. An individual plant may make its rating, but plants in general do not do so. In the annual report of the American Iron and Steel Institute for 1915 there is given a table of the capacity, in steel ingots and castings, as of Dec. 31, 1915. This represents a footing up of the various ratings of the producers themselves. The total capacity as stated is 45,787,780 tons, and adding 2,102,000 tons as the contribution made by the capacity that came in during the following year the capacity for 1916 would be 47,890,000 tons. The production, however (castings being included in this case), was 42,773,680 tons, or 10.7 per cent under the ratings of the manufacturers.

If we make such an allowance from the 9,000,000 tons of reported new capacity we get 8,000,000 tons, which added to the 41,400,000 tons produced in 1916 makes only 49,400,000 tons as the present capacity. On that basis the steel works operated in February at 89.5 per cent of their capacity. No one familiar with the many reports of troubles at steel works, blast furnaces and coke works in February will admit anything of the sort. There is absolutely no reason to assume that capacity is only 10 per cent greater than the output of February.

The divergence between 49,000,000 tons as capacity, on the basis of 1916 production plus new capacity, and 55,000,000 tons as capacity based on last February's production plus restriction caused by temporary and unusual conditions, is perhaps explainable on the ground that the ability of steel works to produce has insensibly increased, in the past few years, as has been the case formerly. Each time a plant is given the opportunity to do its best, through there being a good flow of orders, it is likely to make a new record. Just as with blast furnaces, the practice at open-hearth furnaces has tended to larger outputs under ordinary conditions. Accordingly there is good reason for expecting that when conditions are favorable the United States will produce steel ingots at a rate well above 50,000,000 tons a year.

Railroad Rate Making Discussed

WASHINGTON, March 30.—Methods to be employed by the Interstate Commerce Commission in revising railroad rates to yield a return of 5½ per cent as provided by the new transportation law were under discussion for three days in a hearing before the commission during the past week.

Representatives of the Associated Railway Executives and of the National Association of Owners of Railroad Securities urged the utilization by the commission of the property investment accounts of the carriers as a standard of valuation.

Spokesmen for the Plumb Plan League took issue with the railroad officials, declaring that to fix the rates on the basis of the property investment accounts would simply "build up another vicious circle," and that rates would go up, the cost of living would go up, wages would go up, and the roads would demand another increase in rates.

Representatives of shippers' organizations objected to the use of the property investment accounts as sole basis for valuation. Attorneys for the railroads said that they did not intend that the investment accounts should be used as sole basis for valuation, but that they believed this account represented the minimum figure of the present value of the road, and that the commission should consider this information and whatever data are available.

Cutting Appropriations

WASHINGTON, March 30.—In spite of appeals by Dr. S. W. Stratton, Director of the Bureau of Standards, the Senate Committee on Appropriations failed to make any substantial increase in the allowance for that bureau for the coming fiscal year. The House Committee on Appropriations had cut the item for the bureau to the extent of more than one half million dollars less than it is receiving during the current fiscal year. The Senate committee, however, granted only a single increase for the House bill for the Bureau of Standards. This was the addition of an item for expert optician at $2,000.

The Senate committee reported the annual legislative, executive and judicial appropriation bill which contains the Bureau of Standards appropriations, to the Senate with comparatively few increases. The items for the promotion of foreign trade under the Bureau of Foreign and Domestic Commerce were left exactly as in the bill passed by the House. This means that the Bureau of Foreign and Domestic Commerce will receive substantially the same amount as during the current fiscal year, the House having increased the items to the totals as they now stand after the House Committee on Appropriations had made substantial reductions, including the elimination of the appropriation for the commercial attaches.

Roy M. Wolvin Elected President of Dominion Steel Corporation

At the meeting of the board of directors of the Dominion Steel Corporation held in Montreal March 24, Roy M. Wolvin was elected president of the company and its subsidiary companies, in succession to Mark Workman, who has held the office of chief executive since January, 1916. Mr. Workman at the request of his colleagues on the board, consented to accept the appointment as chairman of the board and to become a member of the London advisory committee of the corporation. No other changes in the directorate were effected at the meeting, nor was any announcement forthcoming regarding the much-discussed merger of the Dominion Steel Corporation and the Nova Scotia Steel & Coal Co. The merger, it was stated by several of the directors, was not discussed by the board, although it is understood negotiations are still proceeding between interests representing the two concerns. The change in the presidency came as an expected event. Mr. Workman's retirement followed an often repeated desire to devote himself to more personal affairs, while the election of Mr. Wolvin has been for some time past regarded as a practical certainty. The election of Mr. Workman to the London advisory committee, of which he is the only Canadian member, was effected at the instance of the British interests who have recently become associated with the affairs of the corporation. A cabled requested from London that he come to England in order to confer with his new colleagues on the committee on matters pertaining to the export trade of the company, was received by Mr. Workman, and he will leave for England in the near future.

Roy M. Wolvin who has become president of the Dominion Steel Corporation has made rapid strides in the industrial world during the past few years. He was born at St. Clair, Michigan, Jan. 21, 1880, he entered the services of the Western Transit Co., at Duluth, with which he was during the years 1896-97. He then became general manager of the Great Lakes & St. Lawrence Transportation Co., and Standard Steamship Co., occupying these positions until 1910. He next became president of the Standard Shipping Co., of Winnipeg, Man., the Duluth Shipping Co., and the Central Shipping Co., of Chicago. He later became president of the Montreal Transportation Co., Ltd., Montreal, Que., and was chosen to many other responsible positions. He has been intimately associated with transportation work, and worked in close contact with J. W. Norcross of the Canada Steamship Lines. He was appointed a director of the Dominion Steel Corporation last year.

Future of France in Producing Iron and Steel

WASHINGTON, March 30.—An increase in the production of iron and steel in France will be one of the results of the war, according to Trade Commissioner Chas. P. Wood, who has just reported to the Bureau of Foreign and Domestic Commerce on the condition of the French mines and iron and steel industries. Mr. Wood says:

"It is clear that France purposes to be one of the greatest iron and steel producing nations. The acquisition of the Lorraine iron ore basin is estimated to have brought an annual output of 42,000,000 tons of ore. The same estimate allows 17,000,000 tons of ore available for export, and predicts that this figure will soon be increased to 25,000,000 tons, stating also that France will have a surplus of 2,000,000 tons of steel for export. There is no question about the war having increased French capacity for production, but there is a question about what France will do to compete with American and British practice. The criticism of French practice has been that there is lack of standardization in the system, whereunder a mill would undertake to manufacture a variety of products. Granting the excellent quality of these products, it is known that such a mill cannot compete in production cost with other mills that obtain a greater rate of production at decreased unit cost by sacrificing variety to standardization. It is thought that some of the new mills taken over with Lorraine will show better results than other mills that have adhered to French practice. If France is to carry out its program to take advantage of its increased facilities in this industry, it will have to sacrifice much of the well-known French preference for a variety of highly finished products, and devote itself to 'smashing out tonnage' according to American standards of operation."

Engineering Board for Reconstructing Palestine

Four experts have been made directors of the technical board of the Zionist Society of Engineers to map out the reconstruction and industrial needs of Palestine, where they will spend part of their time. Dr. L. C. Lowenstein of the General Electric Co., will direct the establishment of public utilities for the future Jewish national homeland; Dr. Ferdinand Sonneborn of L. Sonneborn Sons, Inc., paint and varnish manufacturers, will be in charge of industrial engineering; Lazarus White, president of Spencer, White & Prentid, Inc., engineers and contractors, will direct construction development, and Joseph A. Rosen, vice-president of the Youroveta Home & Foreign Trade Co., is to have charge of agricultural development.

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Slight Decrease in Iron and Steel Exports

Unfavorable Exchange Conditions Do Not Greatly Retard the Foreign Movement, But Some Interesting Features Are Disclosed—Japan An Important Factor

WASHINGTON, March 30.—Adverse exchange rates seem still unable to make a heavy impression on iron and steel imports, chiefly for the reason that the business is largely with countries whose exchange has not been unfavorably affected. The February statistics reveal only a slight setback in the tonnage of iron and steel exports, while the values show a small increase over those for January, 1920. Compared with February, 1919, the February total of the present year shows a considerable increase, although the valuation figures are marked by a decrease. This seems largely due to a shifting of exports to the less highly finished lines.

The figures for machinery exports seem almost stationary, both with regard to comparison with the previous year and for the previous month, although individual items reveal interesting fluctuations.

The imports of iron and steel for February, 1920, dropped considerably below the January imports, but

Exports of Iron and Steel

	February		Eight Months	
	1919 Gross Tons	1920 Gross Tons	1919 Gross Tons	1920 Gross Tons
Ferromanganese	66	77	1,116	1,884
Ferrosilicon	596	89	3,909	333
All other pig iron	20,178	15,573	224,261	179,478
Scrap	217	2,592	1,401	29,175
Bar iron	9,726	2,542	58,797	21,846
Wire rods	9,391	9,429	98,418	64,753
Steel bars	36,266	39,182	316,243	358,120
Billets, ingots and blooms, n. e. s.	10,407	22,693	825,751	193,109
Bolts and nuts	3,640	2,549	23,694	19,889
Hoops and bands	7,001	3,434	38,440	25,188
Horseshoes	175	119	1,127	1,773
Cut nails	457	66	2,341	966
Wire nails	10,232	4,907	55,089	43,352
All other nails, including tacks	2,037	764	10,961	5,946
Cast-iron pipes and fittings	3,863	3,873	25,747	26,831
Wrought pipes and fittings	18,910	14,480	75,658	128,877
Radiators and cast-iron house-heating boilers	139	229	2,276	4,857
Railroad spikes	1,878	1,244	8,089	10,649
Steel rails	66,900	31,241	373,091	347,616
Galvanized sheets and plates	6,304	8,233	43,627	60,589
All other sheets and plates	3,030	855	206,279	21,890
Steel plates	44,917	68,281	440,342	434,845
Steel sheets	13,528	8,879	100,710	93,195
Ship plates, punched and shaped	1,066	877	15,765	11,600
Structural iron and steel	34,225	30,344	183,767	197,161
Tin and terne plates	19,828	19,199	162,111	124,710
Barbed wire	6,360	9,691	163,671	72,739
All other wire	13,845	6,743	110,906	104,160
	234,793	308,185	3,573,523	2,585,531

were still three times as large as the February, 1919, totals.

The aggregate imports of manufactures of iron and steel for February, 1920, were $71,893,929 against $85,328,456 in February, 1919, and $70,226,411 in January, 1920. For the eight months ending with February, 1920, the total was $562,078,685. This figure is far below the corresponding statistics for last year and the year before. For the eight months ending February, 1919, the total was $683,567,266, while for 1918 the same months covering a period of maximum war activity, the total was $778,095,632.

The tonnage totals of exports of iron and steel in February, 1920, aggregated 308,185 tons, which represents less than a 10 per cent decrease from the 33,061 gross tons of January, 1920, and a 30 per cent increase over the 347,793 gross tons in February, 1919. For the eight months ending February, 1920, these exports aggregated 2,585,531 gross tons, against 3,753,523 in the corresponding months for the preceding year. Probably the most interesting change is the increase in the exportation of billets, ingots and blooms, which aggregated 22,693 gross tons in February, 1920, against 10,407 for February, 1919. It is interesting here to note the fluctuations that have taken place in the exports of these wares. In February, 1919, France imported from us 8253 tons, but this dropped to 1117 tons in February,

Exports, January to February, 1920

	Gross Tons		
	All Iron and Steel	Pig Iron	Semi-finished Material
January	360,456	35,793	11,594
February	234,793	20,178	10,407
March	344,506	22,054	8,176
April	408,204	16,300	11,488
May	447,050	32,233	20,771
June	544,580	39,540	46,016
July	287,823	38,373	21,318
August	396,743	36,071	36,162
September	363,505	18,991	37,513
October	302,456	14,108	20,713
November	295,045	21,429	13,211
December	254,676	14,612	21,538
Total	4,239,837	309,682	258,907
January, 1920	333,601	18,468	19,937
February, 1920	308,185	15,739	22,693

1920. On the other hand, the United Kingdom received only 326 tons in February, 1919, against 8622 tons in February, 1920; and Italy, which received only 757 tons a year ago, imported 5206 tons in February, 1920; Canada imported 430 tons in February, 1919, and 493 tons in February, 1920. These comparisons are even more interesting in the figures for the eight months period. For the eight months ending February, 1919, the exports of billets, ingots and blooms totaled 825,751 and dwindled to 193,109 for the eight months ended February, 1920. For the eight months ending February, 1919, France received 302,824 tons, against 27,188 in the same period of the current year. The United Kingdom received 269,126 tons a year ago, against 97,252 this year. Italy's total fell from 92,521 to 46,579; while Canadian imports made the most dramatic decrease, dropping from 159,620 gross tons in the eight months ending February, 1919, to 3156 in the current year.

The exportation of steel rails dropped more than 50

Imports of Iron and Steel

	February		Eight Months	
	1919 Gross Tons	1920 Gross Tons	1919 Gross Tons	1920 Gross Tons
Ferromanganese	2,620	2,939	12,164	23,420
Ferrosilicon	102	821	5,262	10,936
All other pig iron	388	9,436	610	77,401
Scrap, including tin plate scrap	5,164	17,324	61,803	158,787
Bar iron	518	48	1,201	1,527
Structural iron and steel	156	21	2,167	775
Steel billets without alloys	1,901	4,948	21,646	17,032
All other steel billets	330	264	4,144	6,149
Steel rails	1,090	217	7,355	7,373
Sheets and plates	32	84	428	855
Tin and terne plates	...	32	...	245
Wire rods	...	104	1,929	509
	11,211	36,038	118,720	305,009
Manganese oxide	19,579	4,106	313,550	132,928

per cent from 66,900 in February, 1919, to 31,241 in February, 1920. The January, 1920, total was 44,449. In February, 1919, France received from us 49,400 tons of steel rails, but only 4603 in February, 1920. Exportation to Italy was 3476 gross tons in February, 1919, while in February, 1920, she received none. On the

other hand, the Japanese share of our steel rail exports jumped from 327 in February, 1919, to 7161 in February, 1920; Cuba from 2841 to 7763; the Dominican Republic from 77 to 1485; and Brazil from nothing to 2667.

The exports to Japan were largely responsible for the increase in exports of steel plates. In February, 1919, these totaled 44,917 gross tons; in January, 1920, 75,592; and in February, 1920, 68,281. In February, 1919, Japan's share in our exports of steel plates was 11,822 tons, against 20,861 in February, 1920. Canada's share showed a reverse in February, 1919. For February, 1919, the Dominion received 14,899 tons of steel plates, against 12,634 for February, 1920.

The exports of structural iron and steel are gradually returning to the 1919 levels. In February, 1919, they totaled 34,225 gross tons; in December, 1919, they were only 15,375 tons; in January, 1920, they were 27,550, and in February, 1920, 30,344. And here again Japan played an important part, receiving 8007 tons in February, 1920, against 6791 in February, 1919; while Canada's share was only 8860 tons in February, 1920, against 11,886 a year ago. The exportation of barbed wire is still increasing, but it is used on cattle ranges now instead of No Man's Land. It increased from 6360 tons in February, 1919, to 9691 in February, 1920. A year ago, Brazil received from us 1154 tons and this year it took 4204.

The exports of machinery during February, 1920, were slightly below the figures for February, 1919, but higher than in January, 1920; in February, 1920, the total was $32,168,629; in February, 1919, $32,534,116; and in January, 1920, $30,856,432. For the eight months' period ending with February, 1920, these figures aggregated $238,845,601, against $206,045,826 for the preceding year.

Metal-working machinery continues to slump. In February, 1919, the exportation of the various lines including lathes and machine tools aggregated $6,400,717. In January, 1920, they were $3,452,946, and in February, 1920, $3,769,161. The exports of steam engines still show a decided increase over the total of last year. In February, 1919, they aggregated $2,744,539; in January, 1920, $4,720,921; and in February, 1920, $4,702,962. The latter figure includes an interesting item of $314,815 worth of engines which were sent to "Kwantung Leased Territory," which is the synonym of the Bureau of Foreign and Domestic Commerce for the destination of Japanese China, formerly carrying itemized lists. Presumably the new appellation is less irritating from the standpoint of oriental diplomacy.

In February, 1920, the imports of iron and steel into the United States totaled 36,038 tons, against 49,650 in January, 1920; and 11,211 in February, 1919.

Exports of Machinery

	February		Eight Months	
	1919	1920	1919	1920
Adding machines	$515,392	$243,456	$1,816,135	$2,183,213
Air-compressing machinery	254,312	496,935	2,092,833	2,340,363
Brewers' machinery	.....	24,592	59,049	167,086
Cash registers	173,782	520,146	878,980	3,067,110
Parts of	12,578	20,087	97,680	206,332
Concrete mixers	11,530	34,228	183,874	219,679
Cotton gins	59,290	25,384	134,925	101,316
Cream separators	91,833	161,729	580,903	717,649
Elevators and elevator machinery	193,098	118,421	1,727,718	1,374,705
Electric locomotives	43,337	43,707	187,765	811,111
Gas engines, stationary	50,814	74,087	366,616	503,181
Gasoline engines	2,871,224	2,293,706	22,956,885	18,592,892
Kerosene engines	642,026	1,088,830	6,324,165	5,208,368
Steam engines	2,744,539	4,702,962	18,860,551	26,475,766
All other engines	219,970	204,553	3,871,497	1,755,108
Boilers	423,175	449,607	3,824,838	4,246,382
Boiler tubes	912,026	367,437	5,272,802	2,825,811
All other parts of engines	2,411,558	2,028,034	17,364,339	14,908,016
Excavating machinery	91,916	18,314	651,171	712,021
Milling machinery, flour and grist	138,816	36,616	945,800	914,354
Laundry machinery, power	97,208	63,104	308,014	678,206
All other	37,741	46,454	209,403	277,400
Lawn mowers	31,874	18,564	208,581	217,819
Lathes	1,065,043	587,348	5,896,169	5,599,701
Other machine tools	1,548,406	895,675	8,375,278	7,331,897
Sharpening and grinding machines	889,096	261,209	4,099,175	2,890,501
All other metal-working machinery	2,898,169	2,024,929	16,633,786	16,593,783
Meters, gas and water	44,207	48,352	373,976	452,247
Mining machinery, oil well	398,041	293,571	2,300,404	2,251,709
All other	1,070,717	1,125,413	5,971,025	5,416,[illegible]0
Paper mill machinery	168,360	86,557	1,322,979	1,899,151
Printing presses	409,196	369,874	1,470,106	3,610,233
Pumps and pumping machinery	711,450	793,841	4,238,635	6,131,740
Refrigerating and ice-making machinery	197,085	281,717	1,249,563	1,329,911
Road-making machinery	37,518	78,009	486,704	649,833
Sewing machines	1,168,635	1,313,965	7,042,013	8,494,687
Shoe machinery	237,922	148,782	1,154,939	1,896,880
Sugar-mill machinery	1,358,767	638,739	7,765,355	11,232,282
Textile machinery	1,232,318	740,459	6,344,020	9,399,345
Typesetting machines	448,477	316,546	1,420,556	2,011,583
Typewriting machines	1,134,079	1,802,433	5,603,753	12,099,804
Windmills	91,949	107,538	626,335	709,948
Wood-working machinery, saw mill	199,418	97,096	1,010,533	479,218
All other	102 938	231,990	790,398	1,865,720
All other machinery and parts of	5,094,283	6,843,653	32,975,600	47,996,720
	$32,534,116	$32,168,629	$206,045,826	$238,845,601

For the eight months' period ending February, 1920, the total was 305,009 against 118,720 for the eight months of the preceding year.

The chief increase continues to be that of scrap, which rose from 5,164 gross tons in February, 1919, to 17,120 in January, 1920, and 17,324 in February, 1920. The imports of pig iron of all kinds rose from 3,110 in February, 1919, to 23,955 in January, 1920, but dropped again to 13,196 in February, 1920.

In making up these totals, the Bureau of Foreign and Domestic Commerce announces that the total imports of iron and steel for February, 1919, aggregated $2,061,705, against $2,874,771 for February, 1920; while for the eight months ending February, 1919, they aggregated $16,778,509 against $21,622,097 for the same period of the current year. So these figures, therefore, are based on a sadly scrambled variety of exchange rates, and they are not even of comparative value. The last named figures, for instance, were made up of three different types of exchange rate standards.

The importing of manganese ore and oxide of manganese continues to decrease, reaching the low water mark of 4,106 tons in February, 1920, against 19,679 in February, 1919, and 21,463 in February 1918. For the eight months' period of the present year the total was 132,928 tons against 313,550 tons a year ago. O. F. S.

The Baker R. & L. Co., Cleveland, announces the sale of the electric passenger car business to Rauch & Lang, Inc., Chicopee Falls, Mass. The manufacturing space made available will result this year in tripling the industrial truck output and doubling the body production.

Iron and Steel Markets

LESS PRESSURE FOR STEEL

Yet Actual Price Changes Are Upward

Steel Companies Take Railroad Notes for Car Material—Plates Lost to Belgium

Predictions of easier conditions in steel products continue, due in part to the volume of business booked at the Steel Corporation prices and in part to prospects for larger output and freer shipments. Yet current buying and selling show no reduction of the higher prices recently paid in ordinary transactions with independent mills. Practically the only changes are that plates can be had more promptly and that instances are fewer in which buyers urgently offer high premiums to persuade makers to give them prompt material.

Pittsburgh and Youngstown reports of better car supply are offset in part by conditions at Chicago, where cars for finished materials are as scarce as before, though the raw material movement is heavy and production at blast furnaces and steel works is at 90 to 100 per cent of capacity.

The higher coke prices predicted in view of the release of Government control April 1 are already a fact. Blast furnace coke has sold at $10, one such contract as of April 1 calling for 15,000 tons in the second quarter, and as high as $12 has been paid for prompt coke. Higher pig iron, because of higher coke and higher freight rates, is the prediction of sellers, future possibilities of supply and demand getting minor heed in the flurry over fuel.

As independent steel companies one by one open their books for delivery in the third quarter a test will come of the extent to which the gap is to be narrowed between the high premium levels and the year-old prices of the Steel Corporation. Seeing that the independents still have much steel to sell for 1920, market calculations now deal more with the probable sources of demand for nearly 3,000,000 tons per month of finished steel in the remainder of the year.

Jobbers are faring poorly in the distribution of the current product of the mills. In many cases deliveries on their contracts are far in arrears.

Signs are that the steel producers will take some of the notes of the railroads in payment for car building material, just as the car builders themselves have at other times accepted negotiable car trust certificates. One trunk line wanting upward of 13,000 cars is not expected to pay more than 25 per cent in cash. Railroad purchases of the week include 5000 freight cars. Notable among these are 1000 cars of 120 tons capacity for the Virginia Railroad, taking 16,000 tons of steel in addition to 3000 tons for the axles. Fresh inquiries total 6000 cars.

In the structural field, railroad inquiry looms large with a revival of the Southern Railway bridge at Cincinnati of 14,000 tons. About 3000 tons of railroad bridge work was closed. Of the 23,000 tons of general fabricated work put under contract industrial plants will take the most. At Cleveland additional projects planned for this year are held up pending inquiry into the charge that labor and material costs there are the highest in the entire country.

The continued scarcity of sheets is indicated in the intention on the part of a leading producer shortly to apportion its second half output among established customers at prices not yet determined. Very little will apparently be available in the light gages. As high as 16c. a lb. is reported on a lot of 300 tons bought by an automobile maker. In sheet bars the week's developments include an adjustment by a Central Western mill of April shipments at $80, also an offer of $100 per ton for 5000 tons sought by a Detroit automobile company.

An important sale of the week was 10,000 tons of rim sections to a Detroit wheel manufacturer.

A Pittsburgh district mill has made another advance in wire nails to $4.75 per keg. An advance in bar iron is expected at Chicago under considerable railroad buying, and Chicago jobbers' prices on sheets and bolts and nuts are higher.

Unexpectedly increased production by a Belgian plate mill has resulted in the cancellation of nearly 20,000 tons of ship plates ordered in the United States for a British shipyard. Better deliveries and a low price from Belgium were factors. Only 5400 tons of the original order was left in this country, that having been already scheduled for April shipment.

The tendency of pig iron prices in most centers is upward. A St. Louis consumer of basic who offered $43 for 6000 tons for second quarter delivery failed to obtain the iron. Charcoal iron is $1 lower at Chicago where the competition of a Missouri furnace, not usually a seller in that territory, is felt. Other irons at Chicago are not strong. In eastern Pennsylvania, however, nearly all makers are quoting higher prices and this is also true in Virginia. In the South the sale of a large tonnage of foundry iron and some basic by the leading steel company at $38 has had a tendency to prevent price advances and in some other quarters $40 iron is still obtainable there. A Tennessee furnace is selling on that basis.

Pittsburgh

PITTSBURGH, March 30.

There are more favorable features to note in the steel market this week than has been the case for some time. First is the settlement of the coal miners' wage scale, on the basis of a 27 per cent raise effective from April 1, also several local settlements of wages, including molders in closed shops and street railroad employees, and further general reports of material betterment in the car supply, more efficiency of labor, and a larger production of steel so far this month than in February. It is believed many troubles that threatened the steel trade have been fixed up for a year at least, and that labor is commencing to realize that the one best way to start a genuine movement to reduce high cost of living is to get out maximum output, not only in steel, but in all other products as well. Nearly all the large steel companies report that there seems to

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

A Comparison of Prices

Pig Iron, Per Gross Ton:	Mar. 30, 1920	Mar. 23, 1920	Mar. 2, 1920	April 1, 1919
No. 2 X, Philadelphia‡	$46.05	$46.05	$45.35	$31.90
No. 2 Valley furnace†	42.00	42.00	41.00	26.75
No. 2 Southern, Cin'ti†	43.60	43.60	43.60	30.25
No. 2, Birmingham, Ala.†	40.00	40.00	40.00	26.75
No. 2, furnace, Chicago*	43.00	43.00	43.00	26.75
Basic, del'd, Eastern Pa.	44.80	44.80	43.40	29.65
Basic, Valley furnace	42.00	42.00	41.50	25.75
Bessemer, Pittsburgh	43.40	43.40	43.40	29.35
Malleable, Chicago*	43.50	43.50	43.00	27.25
Malleable, Valley	43.00	43.00	42.00	27.25
Gray forge, Pittsburgh	42.40	42.40	42.40	27.15
L. S. charcoal, Chicago	*56.50*	57.50	57.50	38.85
Rails, Billets, etc., Per Gross Ton:				
Bess. rails, heavy, at mill	$55.00	$55.00	$45.00	$45.00
O.-h. rails, heavy, at mill	57.00	57.00	47.00	47.00
Bess. billets, Pittsburgh	60.00	60.00	60.00	38.50
O.-h. billets, Pittsburgh	60.00	60.00	60.00	38.50
O.-h. sheet bars, P'gh.	**80.00**	70.00	65.00	42.00
Forging billets, base, P'gh.	80.00	80.00	80.00	51.00
O.-h. billets, Philadelphia	64.10	64.10	64.10	42.50
Wire rods, Pittsburgh	70.00	70.00	70.00	52.00
Finished Iron and Steel				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	4.25	4.25	4.25	2.595
Iron bars, Pittsburgh	4.25	4.25	4.25	2.35
Iron bars, Chicago	3.75	3.75	3.50	2.50
Steel bars, Pittsburgh	3.75	3.75	3.50	2.35
Steel bars, New York	4.02	4.02	3.77	2.62
Tank plates, Pittsburgh	3.75	3.75	3.50	2.65
Tank plates, New York	4.02	4.02	3.77	2.92
Beams, etc., Pittsburgh	3.25	3.25	3.00	2.45
Beams, etc., New York	3.52	3.52	3.27	2.72
Skelp, grooved steel, P'gh.	2.75	2.75	2.75	2.45
Skelp, sheared steel, P'gh.	3.00	3.00	3.00	2.65
Steel hoops, Pittsburgh	4.00	4.00	4.00	3.05

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	Mar. 30, 1920	Mar. 23, 1920	Mar. 2, 1920	April 1, 1919
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.	5.50	5.50	5.50	4.35
Sheets, galv., No. 28, P'gh.	7.00	7.00	7.00	5.70
Sheets, blue an'l'd, 9 & 10.	4.50	4.50	4.50	3.55
Wire nails, Pittsburgh	4.00	4.00	4.00	3.25
Plain wire, Pittsburgh	3.50	3.50	3.50	3.00
Barbed wire, galv., P'gh.	4.45	4.45	4.45	4.10
Tin plate, 100-lb. box, P'gh.	$7.00	$7.00	$7.00	$7.00
Old Material, Per Gross Ton:				
Carwheels, Chicago	**$37.50**	$37.00	$34.50	$21.00
Carwheels, Philadelphia	*42.00*	42.50	42.50	24.00
Heavy steel scrap, P'gh.	27.50	27.50	27.00	16.00
Heavy steel scrap, Phila.	25.00	25.00	25.50	16.00
Heavy steel scrap, Ch'go.	24.50	24.50	23.50	16.50
No. 1 cast, Pittsburgh	34.00	34.00	34.00	20.00
No. 1 cast, Philadelphia	38.00	38.00	40.00	22.00
No. 1 cast, Ch'go (net ton)	**38.00**	37.50	37.50	22.00
No. 1 RR wrot, Phila.	35.00	35.00	36.50	22.00
No. 1 RR. wrot, Ch'go (net)	**28.00**	27.50	26.00	16.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$6.00	$6.00	$6.00	$4.00
Furnace coke, future	6.00	6.00	6.00	4.50
Foundry coke, prompt	7.00	7.00	7.00	5.00
Foundry coke, future	7.00	7.00	7.00	5.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	**19.25**	18.87½	18.75	15.62½
Electrolytic copper, N. Y.	**19.00**	18.50	18.75	15.37½
Spelter, St. Louis	8.50	8.50	8.75	6.20
Spelter, New York	8.85	8.85	9.10	6.55
Lead, St. Louis	8.75	8.75	9.00	5.00
Lead, New York	9.00	9.00	9.25	5.25
Tin, New York	**63.75**	60.75	63.25	72.50
Antimony (Asiatic), N. Y.	11.50	11.50	11.87½	6.25

be more contentment among their men and more disposition to work harder, which is resulting in larger output.

Another important feature of the market is that tenders of steel business to the mills by insistent purchasers at premium prices are considerably less numerous, and it is believed that in a short time the heavy premiums that have been paid for billets and sheet bars, also for sheets, wire products, tubular goods and other forms of finished steel will begin to disappear. In fact, there is more of a disposition being shown by the independent steel mills to narrow the gap in prices they have been quoting, as compared with the March 21, 1919, prices on steel to which the Steel Corporation subsidiaries are steadily adhering.

There is some excitement in the market on coal and coke for shipment after April 1, and there is wide range in prices being quoted on the two fuels. We note a sale of 5000 tons of standard furnace coke per month for April, May and June at $10, and also a sale of a considerable tonnage of foundry coke for second half delivery at $10, both in net tons at oven. Very high prices are being quoted on coal, but it is believed that within about two weeks prices on both coal and coke will settle down to figures at which producers and consumers will both be satisfied to do business. As yet not much steel business has been placed for second half of the year, the uncertainty as to future costs being so great that the mills do not care to assume the risk. Some consumers, whose wants it seemed necessary to cover for third quarter, and in a few cases over all of last half, have been sold material by the mills at prices to be in effect at the time shipment is made.

Pig Iron.—Higher costs on pig iron seem likely in the near future. The open market on coal and coke means considerably higher prices to some furnaces and mills on those fuels. The advance of $1 per ton on new ore and the probability of higher freight rates are also before the furnaces and are having their influence in selling plans for last half. The local pig iron market is quiet as regards demand, but prices are steady. The Westinghouse Electric & Mfg. Co., which recently bought considerable foundry iron for Trafford City and Cleveland, has an inquiry out for 3000 tons or more of foundry for delivery to its new plant at Essington, near Philadelphia. Probably this iron, if bought, will come from Buffalo, as the rate from furnaces there is less than from the Valleys. Very little is being done in basic or Bessemer, but prices are holding steady at present. Hannah furnace at Youngstown and Atlantic at New Castle of Republic Iron & Steel Co. are banked for lack of coke, but are expected to go in again soon. It is said the product of these two furnaces, which will be basic iron, may be sold in the open market, as the company is getting enough metal from its Haselton stacks to supply its needs at Youngstown. We note sales of about 1000 tons of Bessemer at $42 and about 600 of No. 2 foundry at the same price, Valley furnace.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh districts being $1.40 per gross ton:

Basic	$41.50 to $43.00
Bessemer	42.00
Gray forge	41.00 to 42.00
No. 2 foundry	42.00
No. 3 foundry	41.50
Malleable, Valley	43.00

Billets and Sheet Bars.—The increased production of semi-finished steel by the mills in the forms of billets and sheet bars will probably result before long in lower premium offers for sheet bars by automobile builders, which have been a feature of the steel market for some time. It is said the supply of sheet bars is better, and deliveries by the mills to customers are more prompt. There is some export inquiry for both billets and sheet bars, but little has been done in this

market. The output of billets and sheet bars in March is certain to show a large increase over last month.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at $38 to $70; 2 x 2-in. billets at $42 to $75; slabs, $41 to $75; sheet bars, $42 to $80, and forging billets, ordinary carbon, $80 base, all f.o.b. mill Pittsburgh or Youngstown.

Ferroalloys.—Inquiry for all kinds of ferroalloys is only fair. Consumers seem to be well covered on ferromanganese for last half, but the shortage in supply for spot shipment is causing high prices to be paid and sales of 76 to 80 per cent domestic ferromanganese for spot delivery are still being made at from $225 to $230 per gross ton, delivered. Prices on ferroalloys are firm.

We quote 76 to 80 per cent domestic ferromanganese $180 for last half delivery and $225 to $250 for prompt delivery, with a reduction of $1.50 to $1.75 per unit for lower percentages. We quote 50 per cent ferrosilicon at $85 to $90, and 18 to 22 per cent spiegeleisen at $55 to $57.50, delivered. Prices on Bessemer ferrosilicon are: 9 per cent, $56.50; 10 per cent, $59.50; 11 per cent, $62.50; 12 per cent, $66.10. We quote 6 per cent silvery iron, $45.75 to $46.25; 7 per cent, $50 to $50.50; 8 per cent, $52 to $52.50; 9 per cent, $54 to $54.50, and 10 per cent, $56.50 to $57. An advance of $3.30 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on Bessemer ferrosilicon, and an advance of $2.50 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on silvery iron. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, which has a uniform freight rate of $2.90 per gross ton for delivery in the Pittsburgh district.

Structural Material.—Reports in other sections that demand for structural steel products is dwindling are not heard in the Pittsburgh district, as local fabricators report the new inquiry active, and considerable new work has been placed. The McClintic-Marshall Co. nas taken 2600 tons for a 14-story apartment for the Broadway & Ninety-Eighth Street Realty Co., New York, about 1000 tons for sheet mill buildings for the recently organized Ashtabula Steel Co., Ashtabula, Ohio, 500 tons of bridges for the Goodyear Tire & Rubber Co., Akron, Ohio, 1000 tons for a fertilizer building for Swift & Co. at Norfolk, and 2000 tons for car shops for the Gilbert & Barker Mfg. Co. at Springfield, Mass. The American Bridge Co. has taken 6000 tons of fabricated steel for foundries for the Ford Motor Co. at Detroit and 1200 tons for mill buildings for the United Alloy Steel Corporation, Canton, Ohio. Local fabricators say delivery of plain steel by the mills is very slow, and the two local concerns are reported back nearly six months in delivery. We quote beams and channels up to 15-inch at 2.45c., the Carnegie Steel Co. price, while other mills quote from 3c. to 4c., depending on the buyer, the quantity involved and the delivery.

Plates.—Disappointment is being felt over the slow manner in which the promised inquiries for cars are developing. Local steel car companies say that inquiries promised two or three weeks ago have failed to come out and there is no assurance when they will come on the market. The demand for plates is still heavy, but the stiff premium in prices, which in some cases were 5c. or more, seem to have disappeared to some extent.

We quote sheared plates of tank quality, ¼ in. and heavier, at 2.65c. to 3c. for very indefinite delivery, while prices on ¼-in. and heavier plates, named by mills that will agree to ship out in three to four months, range from 3.50c. to 4c. at mill.

Tin Plate.—It is possible there may be two different prices in effect on tin plate for last half delivery, one that of the leading interest and the other that of some of the independent mills, which feel that increased costs and prospective higher costs fully warrant a higher price than $7 per base box on tin plate for last half delivery. However, some of the independent mills that talk of a higher price for last half secure their sheet bars from a leading interest, and there is a clause in the contracts which states that the buyer of the bars agrees to charge the same price for tin plate as that of the leading interest. It is now between seasons in tin plate and the market is quiet. Mills are very much back in deliveries, and will carry over into third quarter a very large amount of tin plate that should have been shipped out in first half. Output of tin plate this month will show an increase over February.

We quote tin plate for domestic consumers and delivery in first half at $7 per base box, stock items $8.50 to $9, and for export, $10.50 to $12 per base box, all f.o.b. mill Pittsburgh.

Sheets.—Stocks of sheets piled in warehouses by the leading interest and independent mills were reduced to some extent by a better supply of cars, and the belief is expressed that the car situation will soon show steady betterment. The output of sheets is increasing. Due to more efficiency on the part of the men and also to a slightly better supply of steel, shipments and production of sheets in March will show a material increase over last month. Operations of the sheet mills are close to a 90 per cent basis, but shipments are still being made in open cars, consumers agreeing to assume the risk in transportation. Export inquiry is fairly active, but local mills are sold up so far ahead they are not quoting. To regular customers prices quoted below show quotations by the leading interest and also by most of the independent mills for shipment at convenience of the mill.

We quote No. 28 gage box annealed, one-pass black sheets at 4.35c. to 6.50c.; No. 28 galvanized, 5.70c. to 8.50c., and Nos. 9 and 10 blue annealed at 3.55c. to 6c., the lower prices named being the March 21 schedules, which are still named by the leading interest, while the higher prices represent a fair range of quotations by the independent mills.

Wire Rods.—Local mills report there would be no trouble whatever in readily selling soft Bessemer or open-hearth rods for fairly prompt shipment at $70, or higher, at mill. However, two local makers of rods are not selling, as they need their entire output for their own wire mills. We quote soft Bessemer and open-hearth rods at $70, and high carbon rods from $80 to $100 at mill.

Wire Products.—Printed reports of a slowing down in demand in wire and wire nails in other sections do not apply to the local district. Mills continue to report a very active demand for wire and wire nails and are turning orders away every day, some at higher than regular prices, on which they cannot make delivery.

We quote wire nails at $3.25 base, this being the price of the American Steel & Wire Co. and $4 base on the new card recently issued by four or five of the independent mills. We quote bright basic wire at $3, this being the price of the American Steel & Wire Co., and $3.50, this being the price of most of the independent mills.

Hot-Rolled Strip Steel.—Local makers say they are well sold up for first half and are quoting only occasionally to regular customers on such lots as they may have to offer, not yet having opened their books for second half delivery, owing to the uncertainty of future costs. We quote hot-rolled strips to regular customers at 5c. to 7c. at mill, for shipment at convenience of the mill, while in other cases 8c. to 10c. per lb. at mill is quoted.

Cold-Rolled Strip Steel.—Makers report they are sold up for first half and have not yet opened their books for second half delivery. Prices continue to range from 7c. to 10c. per lb. at mill, depending on delivery wanted, the quantity, and whether the price is to a regular customer.

Cold-Rolled Steel Bars.—Two local makers say they are not in the market as sellers, having their entire output sold to July, and have not yet opened their books for delivery beyond that date. The automobile builders continue to take a very large part of the output of shafting, and some are now importuning the mills to cover them for last half delivery. To regular customers, and in large lots for future delivery, the minimum price of cold-rolled steel bars is 4c. at mill, while to other consumers, from 5c. to 7c. is quoted, depending on the quantity and the delivery.

Iron and Steel Bars.—Mills rolling either iron or steel bars are sold up for first half, and several mills have taken all the business that they can turn out for last half delivery. Implement makers are specifying very freely on contracts for steel bars, and the demand for iron bars is active, two local makers being

sold up fully to July, and have not yet opened their books for contracts for last half shipment.

We quote steel bars rolled from billets at 2.35c., this being the price of the Carnegie Steel Co. for very indefinite delivery, likely not before first quarter of next year. Other mills rolling steel bars from billets quote from 3c. to 4c. at mill, prices depending entirely on the buyer and the delivery wanted. The demand for concrete reinforcing steel bars is fairly active, and we quote these, when rolled from billets, at 4c. to 4.25c., and from old steel rails at about 3.50c. at mill. We quote common iron bars at 4.25c. to 4.50c., and refined iron bars 4.50c. to 5c. in carloads, f.o.b. mill, Pittsburgh.

Hoops and Bands.—The Carnegie Steel Co. continues to quote the March 21 price of 3.05c. on steel hoops and bands, usual extras, but another local maker has been quoting 5c. for some time, and has made considerable sales at that figure.

Nuts, Bolts and Rivets.—A local maker reports a sale last week of a car of structural rivets at $4.50 per 100 lb., and the demand for both structural and boiler rivets is heavy. The demand for nuts and bolts is also active, local makers being filled up to July, and not being willing as yet to enter orders for delivery beyond that period. Local makers of nuts and bolts continue to quote small machine bolts with rolled threads at 40, 10 and 5 off list. Prices on rivets, and also discounts on nuts and bolts, all of which are holding firm, are given on page 989.

Spikes.—Two local makers report they have about three months' work ahead on standard railroad spikes, and it is known that some of the leading railroads have not yet covered their needs for this year. The demand for small spikes and boat spikes is reported fairly active.

We quote standard spikes, ½ to 9/16 in. and larger, $4 base per 100 lb. in carload lots of 200 kegs of 200 lb. each, and small spikes, ⅝ in. and 7/16 in., $4.50; 5/16 in., $5; boat and barge spikes, $4.25, f.o.b. Pittsburgh. Tie plates $3 to $4 per 100 lb.

Boiler Tubes.—Mills report the demand for stationary tubes very active and for locomotive tubes also quite heavy. A local interest reports that on seamless steel tubes it is sold up over all of this year and has some orders on its books for first quarter of next year. Discounts on iron and steel tubes are reported as holding firm and are given on page 989.

Iron and Steel Pipe.—A local mill reports that in the past week it has turned down desirable orders for over 10,000 tons of steel pipe on which it could not make the delivery wanted. The Gulf Refining Co. is in the market for a large quantity of 6-in. line pipe for third quarter delivery, but has not yet placed its order. All the mills making iron and steel pipe and oil well tubular goods are practically sold up for the remainder of this year. Reports of an advance in prices on steel pipe, and supposed to be effective from April 1, by a leading interest, are officially denied. In spite of their disinclination to take on more business, several mills report they have been practically compelled to accept orders this month largely in excess of their monthly capacity. Discounts on iron and steel pipe are given on page 989.

Coke.—On Thursday, April 1, the coal and coke market will be open as regards prices, and as yet producers and consumers of coke seem to have no clearly defined ideas as to what prices will prevail. Some producers are quoting as high as $12 for standard furnace coke, but this is a prohibitive price, as a sale of 4000 tons of standard furnace coke for last half of the year has been made at $9 per net ton, at oven. Asking prices on standard 72-hr. foundry coke also show a very wide range, being from $10 to as high as $13 at oven. So far producers of coke are not in a hurry to sell for delivery over all of April, and the above prices are being quoted on coke, loaded on cars for spot shipment. The supply of cars on Saturday and Monday was better than for a long time, and the outlook for this week is good. The transportation troubles in the coke regions of the past four months or more were due more to lack of motive power than to shortage in cars, very often cars loaded with coke standing on tracks at the ovens for two or three days before being started to destination. There is very little coke available for spot shipment, but the demand for it is urgent, and it is likely high prices will rule on furnace coke for spot shipment during a good part of April. Output of coke in the upper and lower Connellsville regions last week was 249,240 tons, an increase over the previous week of nearly 5000 tons. We quote prices, effective from April 1, and after, as follows: standard grade furnace coke, $10, and standard 72-hr. foundry coke, $11, in net tons, at oven. Some producers are asking higher prices, but as yet do not report actual sales.

Old Material.—As yet there is no free buying of scrap by local consumers, who seem to be pretty well filled up. Local dealers who are short on heavy steel melting scrap at about $29, delivered, are said to be bearing the local scrap market in order to cover these short sales at as low prices as they can. Consumers have been pulling quite heavily on their stocks of scrap for the past five or six weeks, and it is believed that within a short time the demand for steel melting scrap will be a good deal better than it is now. The car situation is better, and scrap is moving more promptly to consumers. A local dealer reports a sale of 500 tons of selected steel melting scrap at $27.50 per gross ton, delivered, also a sale of 300 tons of low phosphorus scrap at $31, delivered. We also note a sale of 500 tons of turnings at $18.50, delivered, and dealers are offering $18 freely for turnings. While the market is quiet as regards sales, prices are ruling fairly strong.

We quote for delivery to consumers' mills in the Pittsburgh and other districts that take Pittsburgh freight rates, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	$27.50 to $28.00
No. 1 cast for steel plants	34.00 to 35.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Franklin, Pa.; and Pittsburgh	34.00 to 35.00
Compressed steel	23.00 to 23.50
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh district	18.00 to 18.50
Bundled steel stamping	17.00 to 17.50
No. 1 busheling	19.00 to 20.00
Railroad grate bars	28.00 to 29.00
Low phosphorus melting stock (bloom and billet ends, heavy plates) ¼ in. and heavier	31.00 to 32.00
Railroad malleable	31.00 to 32.00
Iron car axles	38.00 to 39.00
Locomotive axles, steel	33.00 to 34.00
Steel car axles	31.00 to 32.00
Cast iron wheels	41.00 to 42.00
Rolled steel wheels	29.00 to 30.00
Machine-shop turnings	18.00 to 18.50
Sheet bar crop ends (at origin)	30.00 to 30.50
Heavy steel axle turnings	20.00 to 21.00
Heavy breakable cast	33.00 to 34.00
Cast iron borings	19.50 to 20.00
No. 1 railroad wrought	33.00 to 34.00

The Chickasaw Shipbuilding & Car Co. will build four additional ships of the Chickasaw type of 9600 tons deadweight, bringing the total number of ships on order to 14. The two maiden ships of the Chickasaw company sail in April and May for Holland and Japan respectively with Tennessee Coal, Iron and Railroad Co. steel products and other merchandise.

Vol. 1, No. 1 of the *Inco*, a 24-page, unpaged publication of the International Nickel Co., is devoted largely to the uses and properties of Monel metal. The leading article in this first number is by W. L. Wotherspoon, and deals with "Nickel Ore Mining in the Sudbury District, Ontario, Canada," going back to the days of S. J. Ritchie, of Akron, Ohio, founder of the Canadian Copper Co.

Net profits of the T. H. Symington Co. for 1919 were $222,318 to which was added $1,000,000 in dividends of the Symington Corporation and $194,071 in other profits, bringing the total income to $1,416,389. After Federal taxes and preferred dividends earnings on the common stock in 1919 were equivalent to $57.34 a share, compared with $13.90 a share the year before.

Chicago

CHICAGO, March 30.

With no improvement in the car situation and a threatening coal strike, the prospect of uninterrupted production is clouded. Whatever may eventuate in the next week or two, present operation in furnaces and mills is at a high level, bolt and nut plants alone excepted. The foremost steel interest and the leading independents are now producing at the rate of 90 per cent of capacity or more, and other mills and furnaces in this district are on a 100 per cent basis. The Steel Corporation has put in two additional blast furnaces within the past week, making the present status as to the four plants 11 stacks in and one out at Gary, nine in and two out at South Chicago, two in and out Joliet, and one in and one out at Milwaukee.

Orders and inquiries for rolling stock continue to make their appearance. The Rock Island has bought 500 gondola cars and has an option on 500 more. The Virginian has bought 1000 gondola cars of 120 tons capacity from the Pressed Steel Car Co. The Union Pacific and the New River Co., MacDonald, W. Va., are inquiring for 2000 and 1000 gondolas respectively, while the Burlington is asking for figures on 2000 freight cars and 103 passenger cars. Considerable repair work is also being let. Aside from steel for car construction and repairs, neither the leading interest nor the foremost independent is booking additional business in plates, shapes and bars. The latter will apportion its remaining output for the year among old customers. This action will be taken about the middle of April, but the prices to rule have not yet been determined. Buyers will be required to file specific orders, as no contracts will be accepted.

Bar iron is strong and is expected to advance to 4c. soon. Railroads have been heavy buyers of late, in some instances placing individual orders for as high as 1500 tons. Jobbers' prices on sheets and bolts and nuts have again advanced. Cast iron pipe is inactive and pig iron is sluggish with a slight tendency toward weakness. Scrap, in most grades, is higher than a week ago, but is not yet firm at the new level.

Pig Iron.—The market is sluggish and here and there shows slight evidences of weakness. Few orders or inquiries of any consequence have developed, and, excepting a good run of spot business, it may be said that pig iron is experiencing a genuine lull. One of the few sizable purchases of the week covered 1200 tons of foundry and 600 tons of malleable for last half shipment. A Wisconsin consumer bought 600 tons of standard Bessemer at $47, Chicago. This constitutes the most bullish transaction closed for some time and does not seem to conform with the general tenor of the market. While $42, Birmingham, continues to be the ruling price on Southern foundry, there is a small tonnage available at $40, with prospects of considerable more being offered by the furnaces. Charcoal iron can now be had for $54, furnace, and a Missouri maker, rarely a factor in this market, is offering tonnage at $50, furnace.

The following quotations are for iron delivered at consumers' yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, average sil. 1.50 (other grades subject to usual differentials), deliv. at Chicago	$56.50
Northern coke, No. 1, sil. 2.25 to 2.75	45.25
Northern coke foundry, No. 2, sil. 1.75 to 2.25	43.00
Northern high phos. foundry	43.00
Southern coke No. 1 foundry and No. 1 soft, sil. 2.75 to 3.25	50.20
Southern coke, No. 2 foundry, sil. 2.25 to 2.75	48.70
Southern foundry, sil. 1.75 to 2.25	47.00
Malleable, not over 2.25 sil.	43.50
Basic	42.00
Low phos. (copper free)	51.00
Silvery, 7 per cent	$56.40 to 56.80

Ferroalloys.—Producers of ferromanganese have advanced their prices on last half shipments to $200, delivered. Spot material has recently brought from $235 to $250.

We quote 76 to 80 per cent ferromanganese, last half, $200; spot, $235 to $250; 50 per cent ferrosilicon at $85 delivered; spiegeleisen, 18 to 22 per cent, $60 furnace.

Railroad Rolling Stock.—A few additional orders have been placed and a number of new inquiries have appeared. The Rock Island has bought 500 gondola cars from the Bettendorf Co. and has an option on 500 more expiring to-morrow. About 2000 tons of plates, shapes and bars for the cars will be supplied by the leading independent. The Southern Pacific has ordered 53 passenger service cars from the Pullman Co. One thousand tons of plates and shapes and 100 tons of axles for the equipment will be furnished by the foremost interest. The Ryan Car Co. will repair 1000 freight cars for the Baltimore & Ohio, which will require 5000 tons of steel, also to be supplied by the leading interest. The Union Pacific has issued an inquiry for 2000 gondola cars and the New River Co., MacDonald, Va., wants 1000 of the same type cars. The Chicago, Burlington & Quincy is asking for figures on 500 stock and 500 box cars, and 103 passenger service cars. The passenger equipment will require about 2000 tons of steel exclusive of axles. The Northern Pacific is in the market for 100 caboose cars and the United States Smelting & Refining Co. is inquiring for 40 box cars. The Chicago Great Western is asking for figures on the construction of 200 hopper car bodies. The Virginian Railway has bought 1000 gondolas of 120 tons capacity from the Pressed Steel Car Co. The Burlington is inquiring for 1000 gondola cars in addition to the freight equipment previously mentioned. The Donner Steel Co., Buffalo, is in the market for 500 hopper cars. The Western Steel Car & Foundry Co. will repair 1000 steel gondolas for the Erie and 500 for the Pennsylvania. The Liberty Car & Equipment Co. has a contract for the repair of 1000 gondolas for the Chesapeake & Ohio. The Minnesota Steel Co. has bought 16 flat cars.

Plates.—Aside from 8000 tons of plates, shapes and bars to be furnished for the construction and repair of railroad rolling stock, neither the foremost interest nor the leading independent has added to its present commitments. Although the independent mill will open its books for second half business some time in April, it expects to allocate its entire tonnage among old customers. It will take no contracts, but will restrict its bookings to orders for specific tonnages. Its present commitments in light sizes of plates, shapes, bars and sheets are so heavy as to make it unlikely that further orders in those sizes can be accepted.

The mill quotation is 2.65c. to 4c., Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers quote 4.17c. for plates out of stock.

Structural Material.—Fabricators continue to take new business at attractive prices. February, a short month, proved the record month in tonnage booked for one of the leading erecting companies of the country. The leading award of the week, 2000 tons for the Scandinavian American Bank Building, Tacoma, Wash., went to an unnamed fabricator. The Northern Pacific Railroad has let 1800 tons for bridge work to the American Bridge Co. The Wisconsin Bridge & Iron Co. will fabricate 1700 tons for a six-story manufacturing unit to be erected for the Federal Rubber Co. at Cudahy, Wis. The American Bridge Co. is reported to be low bidder on 1800 tons for two plant units to be constructed for the Western Electric Co. in Chicago. Other recent awards include:

Railway Equipment Co., plant addition, Hammond, Ind., 450 tons, to Northwestern Bridge & Iron Co.

John Hoberf Co., paper mill addition, Green Bay, Wis., 200 tons, to Worden Allen Co.

Illinois Central Ry., reinforcing truss span over Fox River, Cotman, Ill., 158 tons, to unnamed fabricator.

P. B. Yates Machine Co., gray iron foundry addition, Beloit, Wis., 80 tons, to Lakeside Bridge & Steel Co., Milwaukee.

Great Lakes Coal & Dock Co., 400-ft. man-trolley coal-handling bridge, to Mead Morrison Mfg. Co.

Wickwire Mining Co., head frame, Upper Michigan operation, 100 tons, to Worden Allen Co.

Current inquiries include:

Oliver Chilled Plow Works, warehouse, paint shop and assembly building, South Bend, Ind., 1500 tons.

Dwarka Cement Co., plant, subsidiary of Tata Iron & Steel Co., India, 800 tons.

Wabash Railroad, bridge over River Rouge, Detroit, 985 tons.

Steel & Tube Co. of America, hotbed and shipping mill building, Indiana Harbor, Ind., 700 tons.

Michigan Avenue Building, Chicago, five-story addition, 500 tons.

Bamberger Department Store, Newark, N. J., 1600 tons.

The mill quotation is 2.45c. to 4.00c., Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote 3.97c. for materials out of warehouse.

Bars.—The shortage of mild steel bars is causing railroad and car builders to substitute bar iron when practicable. The demand from these sources is heavy and a general advance to 4c. is expected within 30 days. During the past week, several lots of 1500 tons and at least one of 1000 tons have been bought by the railroads. Pending inquiries for bar iron from the rail lines exceed 2000 tons. Rail carbon steel bars are in good demand. A prominent rerolling mill, which has been sold ahead for some time, is now able to make limited shipments out of stock as the result of the improved operations. This material is commanding 4¼c., mill, whereas shipments against contracts are being invoiced at 3.75c. Some orders for hard steel bars are still being closed at 3½c. An inquiry from Cuba for 1000 tons of deformed bars was recently turned down by a local mill.

Mill prices are: Mild steel bars, 2.35c. to 4.25c., Pittsburgh, taking a freight of 27c. per 100 lb.; common bar iron, 3.75c., Chicago; rail carbon, 3.50c. to 4.00c., mill. Jobbers quote 3.87c. for steel bars out of warehouse.

Sheets.—About the middle of April, the foremost independent will apportion its second half output among old customers at prices not yet determined. It will have little tonnage in light gages to offer. The acute shortage of sheets has been reflected in another advance by the local jobbers.

Mill quotations are 4.35c. to 6.50c. for No. 28 black; 3.55c. to 6c. for No. 10 blue annealed, and 5.75c. to 8.50c. for No. 28 galvanized, these all being Pittsburgh prices, subject to a freight of 27c. per 100 lb. to Chicago. The lowest prices are those of March 21.

Jobbers quote, Chicago delivery out of stock No. 10 blue annealed, 6.52c.; No. 28 black, 7.50c.; No. 28 galvanized, 9c.

Wire Products.—The car situation is getting worse rather than better. One day recently, the mills of the leading interest were short 1105 cars. Production, however, is good, but with warehouses filling up it is a question how long a curtailment in operation can be prevented. The foremost maker has placed all its customers on a replacement basis; that is, they are given the privilege of placing a new order as soon as they receive a shipment. This interest has abandoned the practice of taking orders on the basis of prices ruling at time of delivery, as it was found a source of considerable complication for the purchaser. Any advance, if made, will take effect on subsequent business only. The railroads continue to make heavy purchases of nails for car repairs. For prices see finished iron and steel, f.o.b. Pittsburgh, page 989.

Rails and Track Supplies.—The leading interest is again booking light rails freely from domestic buyers, but is promising no definite deliveries. Foreign business is being accepted only when it is exceedingly attractive. We quote:

Standard Bessemer rails, $45 to $55; open hearth rails, $47 to $57. Light rails, 2.45c. f.o.b. makers' mills.

Standard railroad spikes, 3.55c. to 4c. Pittsburgh. Track bolts with square nuts, 4.90c. to 5c., Pittsburgh. Steel tie plates and steel angle bars, 2.75c., Pittsburgh and Chicago; tie plates, iron, 3.75c., f.o.b. makers' mills.

Cast Iron Pipe.—The pipe market is inactive, being devoid of any large new lettings or inquiries. Milwaukee has awarded 141 tons to the United States Cast Iron Pipe & Foundry Co.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., $75.80 to $77.80; 6-in. and above, $72.80 to $74.80; class A and gas pipe, $2 extra.

Bolts and Nuts.—Because of unsatisfactory operation, manufacturers are forced to reject much of the business offered them. One Western maker has turned down orders for 25,000,000 bolts and nuts within the past week. Jobbers' prices have advanced. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 989. The mill discount on small machine bolts, rolled threads, is 40 and 10.

Jobbers quote structural rivets, 5.37c.; boiler rivets, 5.47c.; machine bolts up to ⅞ x 4 in., 30 per cent off; larger sizes, 20 off; carriage bolts up to ⅞ x 6 in., 20 off; larger sizes, 15 off; hot pressed nuts, square tapped and hexagon tapped, 50c. off; coach or lag screws, gimlet points, square heads, 40 per cent off. Quantity extras are unchanged.

Old Material.—Consumers are buying more freely but not in large enough volume to give prices. There is a decided upward trend. While there have been advances in a number of items, a few grades have weakened. The largest purchase by a user involved 7000 tons of shoveling steel which brought $24. Because of labor shortage a number of railroads have offered mixed scrap of late. Last week one line advertised 23 cars and another 15 cars, but without success, as the dealers themselves are short of workmen to sort the material. Railroad offerings this week include 4000 tons advertised by the Rock Island, 1500 tons by the Grand Trunk and 700 tons by the Chicago & Alton.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	$34.00 to $35.00
Relaying rails	40.00 to 50.00
Car wheels	37.50 to 38.50
Steel rails, rerolling	33.00 to 34.00
Steel rails, less than 3 ft.	29.00 to 29.50
Heavy melting steel	24.50 to 25.00
Frogs, switches and guards, cut apart	24.50 to 25.00
Shoveling steel	23.50 to 24.00
Low phos. heavy melting steel	28.50 to 29.00
Drop forge flashings	19.00 to 20.00
Per Net Ton	
Iron angles and splice bars	$31.50 to $32.50
Steel angle bars	25.50 to 26.00
Iron arch bars and transoms	33.00 to 34.00
Iron car axles	39.00 to 40.00
Steel car axles	34.00 to 35.00
No. 1 busheling	21.00 to 22.00
No. 2 busheling	14.50 to 15.00
Cut forge	25.00 to 25.50
Pipes and flues	18.50 to 19.00
No. 1 railroad wrought	28.00 to 28.50
No. 2 railroad wrought	25.00 to 25.50
Steel knuckles and couplers	24.00 to 24.50
Coil springs	27.50 to 28.00
No. 1 cast	38.00 to 38.50
Boiler punchings	25.50 to 26.00
Locomotive tires, smooth	25.00 to 25.50
Machine shop turnings	13.00 to 13.50
Cast borings	14.00 to 14.50
Stove plate	31.00 to 31.50
Grate bars	30.50 to 31.00
Brake shoes	26.00 to 26.50
Railroad malleable	28.50 to 29.50
Agricultural malleable	27.00 to 28.00
Country mixed	18.00 to 19.00

Buffalo

BUFFALO, March 29.

Pig Iron.—Furnaces find that though they seem to have been sold up solidly some weeks ago, there is a certain latitude between original orders from foundries and subsequent call for material that is affording a little easement in the situation, so that furnaces find themselves able to sell a little iron from time to time over and above what they had calculated. During the past week approximately 4000 tons of foundry was sold for last half delivery. None of it was sold, furnace men say, at the $43 price which obtained in one 3000 to 4000 ton transaction last week. All of it was disposed of at a base price of $45 for No. 2 plain, $46.25 for No. 2X and $48 for No. 1. All was for delivery over last half. The situation appears to be strong and a strong volume of trading in special irons from outside the district leads furnace men here to believe that the local prices may strengthen unexpectedly within the near future.

We quote f.o.b. Buffalo:	
No. 1 foundry, 2.75 to 3.25 silicon	$48.00
No. 2 X foundry, 2.25 to 2.75 silicon	46.25
No. 2 plain, 1.75 to 2.25 silicon	45.00
Basic	$41.00 to 43.00
Malleable	46.25
Lake Superior charcoal	58.00 to 60.00

Finished Iron and Steel.—The situation retains most of the phases that have characterized it for some weeks. Demand for material is just as insistent as ever, though the inquiry seems to be for larger tonnages and slightly smaller in volume. These inquiries apply particularly to bars, shapes and tin plate. There is likewise a constant inquiry for wire products, both for carload lots and less than carload lots, a condition which indicates the depleted state of warehouse stocks. There has been an increase in the price of cold-finished steel. The minimum has moved from 4c. to 4.25c. base, and ranges as high as 6c., especially for sizes under 1½ in. Plates are a little easier. One mill here is making a bid for plate tonnage, it is understood. Nail and wire mills are turning down business constantly, and one large mill that ordinarily produces sufficient wire rods for its own

needs is in the market now endeavoring to buy them. Spring business in reinforcing bars is slow and is not coming out in the volume expected. Mills are taking little. John W. Cowper Co. has the general contract for an addition to the plant of Joseph T. Ryerson & Sons, Buffalo. The approximate size of the addition is 126 x 270 ft. It is of brick and steel construction, is to cost $250,000 and will require 450 tons of structural steel, which will be fabricated by the Ryerson company. Mills report fair supplies of gondola cars. The material is moving more freely through the use of open cars for wire, nail and cold finished material shipments.

Jobbers quote: Soft steel bars, $4.06; steel plates, $4.11; structurals, $3.91; bands, $4.76; hoops, $5.01; blue annealed sheets, $5.71; No. 28 black sheets, $8.25; No. 28 galvanized sheets, $9.50.

Coke.—Sellers here report heavy sales on the Connellsville basis. Consumers are inclined to be anxious about the fuel situation and glad to cover.

Old Material.—The market shows indications of a more active condition, but up to this time has evidenced itself only in inquiry. So far as can be learned, few real sales have been made on the very fair volume of inquiry. There are, for instance, seven or eight inquiries for low phosphorus scrap by railroad equipment plants. These inquiries will average around 2000 tons apiece and have been in the market for over a week. They appear to be tentative in character and placed more with an idea of learning what price conditions are than to proceed with immediate business. The cause of this probably lies in the fact that though the business to be had from railroads by these plants is eventual, the original equipment contracts have not been definitely closed, so that activity in the way of actual scrap sales will wait on the actual closing of equipment business by these plants. The situation is stronger than last week.

We quote dealers' asking prices, per gross ton f.o.b. Buffalo, as follows:

Heavy melting steel, regular grades	$25.00 to $26.00
Low phos., 0.04 and under	32.00 to 33.00
No. 1 railroad wrought	31.00 to 32.00
No. 1 machinery cast	38.00 to 39.00
Iron axles	40.00
Steel axles	41.00 to 42.00
Car wheels	37.00 to 38.00
Railroad malleable	31.00 to 32.00
Machine-shop turnings	16.50 to 17.00
Heavy axle turnings	20.00 to 21.00
Clean cast borings	17.00 to 18.00
Iron rail	30.00 to 31.00
Locomotive grate bars	24.00 to 25.00
Stove plate	32.00 to 33.00
Wrought pipe	21.00 to 22.00
No. 1 busheling	20.00 to 21.00
Bundled sheet stamping	17.00 to 18.00

Birmingham

BIRMINGHAM, ALA., March 29.

Pig Iron.—The following statement, dated March 27, is one of exact fact: "The leading interest has in the past 10 days sold a very large tonnage of iron f.o.b. Birmingham, the major portion of the tonnage being foundry, for third and fourth quarter deliveries, on the uniform base of $38." Other sales during the same period by other Birmingham interests included these: About 2000 tons for New England delivery at $42, and about the same tonnage by the same interest for Ohio and contiguous territory at $42, delivery being partly for second and partly for third quarter; 1000 tons for nearby delivery by another interest at $41.50 and, a day or so after this sale, 2000 tons booked by this interest for third quarter and last half at $40. A large foundry interest made a few small bookings at $42 on pressure for spot deliveries. Small furnace interests have sold small tonnages at $41 and $42. A stray lot now and then has gone at $43 to distressed consumers on sales by agents who get $1 per ton for making sale. In the 10-day period referred to, the bulk of bookings was at $38. This is the first time that has occurred since the $40 level was established in January. Undoubtedly the action of the Steel Corporation's auxiliary has checked advances in Birmingham iron, and up to the close of the period referred to had prevented what would otherwise have been a $42 market. However, those holding for $42 maintain a stiff front and are apparently waiting content on development. Most of the independents express satisfaction in the course of the leading interest as a runaway market preventative, while still allowing them to sell capacity at a minimum of $40, which affords a good profit. April will probably witness an increase in production. Shipments, even for district consumption, are still handicapped by car shortage. Steel mills are three to five months behind in deliveries. The Southern iron melt continues to increase and will be much larger the second half of the year owing to the incoming of many new foundries.

We quote per gross ton, f.o.b. Birmingham district furnaces, the Tennessee company excepted, as follows:

Foundry, silicon 1.75 to 2.25	$40.00 to $42.00
Basic	39.00 to 41.00
Charcoal	55.00

Cast Iron Pipe.—Pipe shops report better labor conditions than have existed since the war. Work has begun on the Eastham soil pipe shop at Anniston. The Lynchburg Co.'s high pressure pipe works there has resumed in full, following idleness during the war period. K. F. Conville and others have incorporated the Birmingham Pipe & Fittings Co. and will erect a foundry and pipe shop. Demand for flange pipe for oil well use is about 100 per cent above plant capacity. All pipe shops are busy. The price schedule remains at $69 for 4 in. and $66 for 6 in. and upward.

Coal and Coke.—Alabama coal output averages 320,000 tons per month. The Birmingham By-products Co. began operations of new plant Monday, the Woodward Iron Co. taking a portion of the output since putting out its own beehive ovens.

Old Material.—Cast scrap is as strong as steel scrap is weak and the former moves in quantities, while the latter is shipped on contracts only, the yards holding as firmly as possible for an advance of $3 per ton, which large consumers decline to pay.

We quote per gross ton, f.o.b. Brimingham district yards, prices to consumers, as follows:

Steel rails	$21.00 to $21.50
No. 1 heavy steel	20.00 to 20.50
Cast-iron borings	11.00 to 11.50
Machine-shop turnings	11.00 to 11.50
Stove plate	24.00 to 24.50
No. 1 cast	31.00 to 32.00
Car wheels	30.00 to 31.00
Tramcar wheels	28.00 to 29.00
Steel axles	29.00 to 30.00
No. 1 wrought	21.00 to 21.50

Boston

BOSTON, March 30.

Pig Iron.—Between 4200 and 4500 tons was sold here during the past week, mostly eastern Pennsylvania. One house sold about 1000 tons in 200-ton and 300-ton lots, No. 2 plain and No. 2 X, second half delivery, at $45 furnace base. Another house sold 100 tons No. 2 plain, April and May iron, at $44.50 furnace. A Providence consumer bought No. 2 X eastern Pennsylvania, second quarter iron, at $45 furnace, and No. 2 X Virginia, last half iron, at $44.25 furnace, the total amount involved being 500 tons. Contrary to reports, the Bethlehem Steel Corporation is not after business in New England. The Virginia Iron, Coal & Coke Co. has taken second half business on a $42 furnace base, and another furnace sold 200 tons, last quarter iron, No. 2 X, at $44.25 furnace. Alabama iron at $40 furnace base has disappeared. One house sold about 500 tons, silicon 2.75 to 3.25, at $45.40 furnace. No other sales are reported. The only Buffalo iron sold was 200 tons resale on a $44 furnace base. Two cars of spot New England charcoal iron sold at $70 furnace, an advance of $5 per ton. A Connecticut pump concern is in the market for 300 tons Virginia, silicon 2.25 to 2.75, 300 tons No. 1 X iron, 300 tons northern No. 2 X and 300 tons silicon 2.75 to 3.25, last half delivery. No other large inquiries are noted, but several large consumers remain uncovered for the last half. Delivered pig iron prices follow:

East. Penn. silicon, 2.25 to 2.75	$48.15 to $49.15
East. Penn. silicon, 1.75 to 2.25	46.90 to 47.90
Buffalo silicon, 2.25 to 2.75	49.15 to 50.15
Buffalo silicon, 1.75 to 2.25	47.90 to 48.90
Virginia silicon, 2.25 to 2.75	47.95 to 48.95
Virginia silicon, 1.75 to 2.25	46.70 to 47.70
*Alabama silicon, 2.25 to 2.75	49.35 to 50.35
*Alabama silicon, 1.75 to 2.25	47.75 to 48.75

*Alongside Boston prices.

Coke.—Connellsville ovens are not accepting new customers here, but will take, for the first time in 1920,

orders for last half coke from regular trade on a $10 oven base. Foundries are well covered on 1920 last half New England made coke.

Finished Iron and Steel.—The market has been quiet the past week. No important structural awards are reported locally. The Memphis Steel Co., Pittsburgh, was awarded the structural steel for the new East Springfield, Mass., Westinghouse Electric & Mfg. Co. plant, through Pittsburgh. Mills will accept orders for universal plate, but not for others. One mill booked a small tonnage of steel bars this week at 3½c. f.o.b. Pittsburgh, but as high as 5c. is obtained by some re-rolling mills. A Massachusetts washing machine company and other interests have recently bought sheets for June and July shipment at prices ruling date of shipment, but most mills will not accept business at any price. New England car building companies will soon be asked for bids on new cars by practically all of the New England railroads. The Laconia Car Co., Laconia, N. H., has just booked orders for 75 electric cars.

Warehouse Business.—The iron and steel supply situation is less acute but still unsatisfactory, No change in prices is recorded. Small sizes of bolts continue scarce. Local jobbers say new mill contracts for bolts call for 50 per cent of ½ in. and larger. The Boston & Maine Railroad is still placing large orders for bolts and nuts, especially the latter, with local jobbers. The Boston & Albany is fairly well supplied. A Rhode Island set and cap screw manufacturer has recently sold his entire stock to an automobile accessory house on a list net basis. Some New England cap and set screw makers talk of a four to six week shutdown unless they secure stock from the mills within the near future.

Jobbers quote: Soft steel bars, $5 base per 100 lb.; flats, $5.50 to $5.85; concrete bars, $5 to $5.50; tire steel, $6 to $6.50; spring steel, open hearth, $10; crucible, $15; steel bands, $6.75; steel hoops, $7.75; toe calk steel, $6.75; cold rolled steel, $6.50 to $7; structural, $5; plates, $5.50; No. 10 blue annealed sheets, $6.55; No. 28 black sheets, $8.55; No. 28 galvanized sheets, $10; refined iron, $5 base; best refined, $6.50; Wayne, $7.50; band iron, $6.75; hoop iron, $7.75; Norway iron, $20.

Old Material.—Larger offerings of machinery cast are noted, but the demand has been good and prices hold well. A Worcester, Mass., foundry took 500 tons cast, a New Hampshire foundry 200 tons, and numerous others from 30 tons up to 100 tons. Strictly No. 1 cast has sold at $45 to $46 delivered, No. 2 at $41 to $42 delivered, and mixed at $42.50 to $43 delivered. Dealers have paid as high as $41 f.o.b. shipping point for small lots of No. 1 cast. The American Brake Shoe & Foundry Co. and stove manufacturers have bought stove plate at $33.50 to $34 delivered. Car wheels have been offered at $40 f.o.b. shipping point, but $39 is about the best bid made on them. The Griffin Car Wheel Co. did not sell the 1000 tons of car wheels offered f.o.b. Chelsea. One local house is buying No. 1 heavy melting steel at $21.40 f.o.b. shipping point against orders taken from eastern Pennsylvania steel mills, and has paid as high as $31 for No. 1 railroad wrought, but the wrought and heavy steel market, generally speaking, is at a standstill. Turnings and borings are easier, only top prices being paid for small choice lots. The Boston & Albany sold no scrap this month and the Boston & Maine but 15 cars. Both railroads are expected to have larger offerings next month. Buying of pipe continues on a limited scale. No re-rolling rails have been offered for some time and the market is largely nominal.

Prices as quoted by the local yards follow:

No. 1 heavy melting steel	$20.00 to $21.00
No. 1 railroad wrought	30.00 to 31.00
No 1 yard wrought	25.00 to 26.00
Wrought pipe (1 in. in diameter, over 2 ft. long)	21.00 to 22.00
Machine shop turnings	15.50 to 16.00
Cast iron borings	18.00 to 19.00
Heavy axle turnings	17.50 to 18.50
Blast furnace borings and turnings	15.00 to 15.50
Forged scrap	16.50 to 17.50
Bundled skeleton	16.50 to 17.50
Street car axles	31.00 to 32.00
Car wheels	38.00 to 39.00
Machinery cast	39.00 to 40.00
No. 2 cast	36.00 to 37.00
Stove plate	29.00 to 30.00
Railroad malleable	29.00 to 30.00
Rerolling rails	29.00 to 30.00

St. Louis

ST. LOUIS, March 29.

Pig Iron.—There has been a revival of small order buying in the pig iron market during the past week, the individual tonnages ranging from 500 tons down to car lots. These orders have included last half, last quarter and even November and December delivery, while there has also been some considerable demand for spot shipment iron, on which, however, it was not always possible to close transactions because of the condition of the furnaces. There have been no calls for basic pig, as the consumers of this territory are still pretty well supplied, at least until railroad orders, which are expected to begin to come in in larger numbers than at present. The quotations here have been $42 to $43 per ton Birmingham for No. 2 Southern, with No. 2 Northern held at $46 per ton Ironton and Lake Superior charcoal iron at $55 per ton. Most of the inquiry which has come forward or is now pending is from the gray iron foundries.

Coke.—The release of coke from Government control has enabled the making of quotations, but there have been no orders placed, as the ovens are not yet ready, so far as local representatives can learn, to take business or, perhaps, to ship it, the latter because of the transportation situation. The price made here for beehive coke is $10 per ton Connellsville, but with no business transacted. Quotations have not yet been made on Virginia or New River coke while by-product coke, being sold up for the producers in this area, is not figuring in the market.

Finished Iron and Steel.—The warehouses during the week marked up sheets $10 per ton and report the situation as to deliveries about as it has been with the exception of blue annealed sheets which are in slightly better condition.

For stock out of warehouse we quote as follows: Soft steel bars, 3.94c.; iron bars, 4.59c.; structural material, 4.04c.; tank plates, 4.24c.; No. 10 blue annealed sheets, 6.59c.; No. 28 black sheets, cold rolled, one pass, 7.60c.; No. 28 galvanized sheets black sheet gage, 9.10c.

Old Material.—While there is a better feeling the various items on the old material list do not show any appreciable change, as there have been no transactions of sufficient moment to make a market. Dealers generally are optimistic regarding the future and are not disposed to make any sacrifices, but rather to carry the material on the yards awaiting further developments. No lists appeared during the week and none are expected now until after the first of the month, when it is likely that the railroads will have some scrap to offer, as it is now becoming possible to pick up material, provided cars can be obtained to transport it.

We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	$32.50 to $33.00
Old steel rails, rerolling	32.50 to 33.00
Old steel rails, less than 3 ft.	28.00 to 28.50
Relaying rails, standard sections, subject to inspection	50.00 to 55.00
Old car wheels	34.50 to 35.00
No. 1 railroad heavy melting steel	23.50 to 24.00
Heavy shoveling steel	22.00 to 22.50
Ordinary shoveling steel	21.50 to 22.00
Frogs, switches and guards, cut apart	24.50 to 25.00
Ordinary bundled sheets	14.50 to 15.00
Per Net Ton	
Heavy axle and tire turnings	17.00 to 17.50
Iron angle bars	29.50 to 30.00
Steel angle bars	24.00 to 24.50
Iron car axles	39.50 to 40.00
Steel car axles	33.50 to 34.00
Wrought arch bars and transoms	31.00 to 31.50
No. 1 railroad wrought	25.50 to 26.00
No. 2 railroad wrought	23.50 to 24.00
Railroad springs	24.00 to 24.50
Steel couplers and knuckles	24.00 to 24.50
Locomotive tires, 42 in. and over, smooth inside	23.50 to 24.00
No. 1 dealers' forge	23.00 to 23.50
Cast iron borings	15.00 to 15.50
No. 1 busheling	22.00 to 22.50
No. 1 boiler, cut to sheets and rings	18.50 to 19.00
No. 1 railroad cast	35.50 to 36.00
Stove plate and light cast	30.50 to 31.00
Railroad malleable	26.00 to 26.50
Agricultural malleable	25.50 to 26.00
Pipes and flues	20.50 to 21.00
Heavy railroad sheet and tank	20.00 to 20.50
Railroad grate bars	29.50 to 30.00
Machine-shop turnings	14.50 to 15.00
Country mixed	20.50 to 21.00
Uncut railroad mixed	21.00 to 21.50
Horseshoes	24.50 to 25.00

New York

NEW YORK, March 30.

Pig Iron.—Several sales for export have been made, including 2000 tons of Bessemer and 1000 tons of foundry grades for Italy, and it is expected there will be more exporting in spite of the unfavorable exchange conditions. A leading Virginia interest returned to the market for a short time, selling a fair tonnage at $42 furnace, and then withdrew. Some other Virginia furnaces are adhering to $42, but others are quoting $43. At Buffalo the quotations still range from $43 to $45. In eastern Pennsylvania $44 furnace seems to be the minimum, with still higher prices being paid for some tonnage. Virginia furnaces are having a great deal of trouble getting coke and their production is curtailed for this reason. A sale of a few hundred tons of furnace coke has been made at $10, and some sellers are asking $11 and even $12. The advance in the price of coke is expected to have a tendency to bring higher prices of pig iron.

We quote for delivery in New York as follows:

No. 1 foundry, sil. 2.75 to 3.25	$48.05 to $50.05
No. 2 X, sil. 2.25 to 2.75	47.05 to 49.05
No. 2 plain, sil. 1.75 to 2.25	45.80 to 47.80
No. 2 X, Virginia, sil. 2.25 to 2.75	46.40 to 47.40

Ferroalloys.—The ferromanganese market continues to advance. American producers in the last week have raised their price from $180 to $200, delivered, for the last half. For spot and early delivery only a limited amount is available for which $250 has been asked. Some sales for last half were made at $180, but demand for any position is not particularly heavy. A new producer in the market is offering limited amounts of the alloy at $250 for prompt and lower values for later deliveries. Practically no British alloy for any position is being offered, and in two cases deliveries on present contracts will have to be delayed because of the unexpected scarcity of manganese ore in Great Britain. There is the possibility also that British consumers may have first call on some of this. Imports of ferromanganese in February were 2939 tons, which compare with an average of 2752 per month in all of 1919. Spiegeleisen is more active and stronger, the minimum price now being $62, furnace. Sales for domestic and export delivery aggregate 4000 tons. Less than 1000 tons of high grade manganese ore have been sold for early delivery at 80c. per unit and there are prospects of further sales of Chilean, Java and Indian ore. It develops that the sale of 15,000 to 20,000 tons a short time ago involves a delivery of the ore over a period of a year to a large consuming interest. Prices for manganese ore range from 65c. to 80c. per unit, seaboard, depending upon the quantity and delivery, as well as the source of supply. Imports in February were only 4106 tons, the lowest since early in 1915. Ferrosilicon, 50 per cent, is quiet but strong at $85 to $90 per ton, delivered. Quotations for ferrotungsten are 80c. to $1.15 per lb. of contained tungsten. Ferrovanadium is quoted at $6.50 to $7 per lb. of contained vanadium in wholesale lots for early delivery, but these are nominal, the alloy being exceedingly scarce. Ferrocarbontitanium, 15 to 18 per cent, is selling at $200 per net ton in carload lots, at $220 per ton in lots between one ton and a carload, and at $250 per ton in lots less than a ton, f.o.b. Suspension Bridge, N. Y.

Finished Iron and Steel.—Negotiations for the purchase of rolling stock are involving a new feature so far as the steel producer is concerned. The leading interest is said to have expressed a willingness to take notes in part payment for car material to assist the car builders, who have occasionally in other times done this to a greater or less extent. One trunk line wanting 13,000 or more cars is expected to pay 25 per cent in cash and to give certificates and notes for the rest. The most notable car purchase was 1000 coal cars of 120 tons capacity, involving 19,000 tons of steel, placed with the Pressed Steel Car Co. by the Virginian Railroad. Export trade continues remarkably active. A number of exporters claim to note an easier situation as regards deliveries, with plates, for example, obtainable in six to eight weeks. Production has increased at the mills, and with better transportation facilities conditions point to a freer degree of contracting in the early future, although the mills are just as hesitant or apathetic as ever to new projects. A cancellation of nearly 20,000 tons of plates for shipbuilding in England is noted, solely because Belgian plates are now obtainable at the desired deliveries and at delivered prices considerably below those of the American product. About 1000 tons of plates were sold for the Orient at the 3.75c. Pittsburgh basis, but the rest of the lot had to be bought at 4c. For 1000 tons of boiler steel for export for the second quarter 4c., Pittsburgh, was paid, and 600 tons went at the same price for domestic consumption. Several thousand tons of tank plates are pending for Japan. Railroad bridge work inquiries include 700 tons for the Norfolk & Western and 500 tons for the Boston & Maine, while 1100 tons have been placed with the American Bridge Co. for the Connecticut River bridge for the Boston & Maine at Holyoke. The largest structural letting covers 5500 tons for the Fisk Rubber Co., New York, awarded to the American Bridge Co., which has also taken 1200 tons for a savings bank at Flint, Mich. The Lackawanna Bridge Co. will erect a pier at Castle Point, N. J., taking some 2000 tons, while bids on a piershed for New York City, involving 1000 tons or more, overran the appropriation.

We quote for mill shipment, New York, as follows: Soft steel bars, 2.62c. to 4.77c.; shapes, 2.72c. to 4.27c.; plates, 2.92c. to 4.27c., the minimum prices being for indefinite delivery and the higher prices for the second quarter; bar iron, flats, wider than 6 in., 4.57c.; ⅜ and 7/16 in., round and square, 5.27c.; light rounds, squares and flats, 5.77c., and other sizes, 4.27c.

Warehouse Business.—Shortage of supplies and small stocks continue to be a serious consideration. Mills that ordinarily would open their books for third quarter business on April 1 have in many cases already booked orders for third quarter delivery. Warehouses are paying high prices to mills that have opened for small tonnages. They complain of an acute shortage of high carbon billets. A number are expecting to increase prices of structural steel within a week or ten days. The demand for iron and steel bars is heavy for small sizes, which are obtained from the mills only with difficulty and sell at higher prices than quotations for the larger sizes. Although prices on pipe are unchanged for large sizes, one interest is preparing to change its schedule of prices to conform with recent changes in the smaller sizes, which are in heavy demand. Tire steel, which has increased from 4.15c. to 4.75c. per lb., New York, is being sold in many instances much higher. We quote prices on page 1008.

High Speed Steel.—Prices on domestic high speed steel of the best quality seem to be firm at from $1.25 to $1.30 per lb. Importations from Sweden and England, which are being made in small quantities by some importers, have sold as low as 90c. and 92c. per lb. Some of the imported steel, however, is being sold close to the market price.

Cast-Iron Pipe.—Two chief factors are hindering manufacturers in making deliveries: One the lack of labor and the other the embargoes on the railroads, particularly through New England, an important market in this section. One manufacturer states that he needs 150 additional laborers but cannot get them. Inquiries are coming from both the Far South and Middle West from consumers who never before called upon Eastern manufacturers. Bids were opened last week for 1800 tons of 8 and 12-in. pipe for the Department of Water Supply, Gas and Electricity for the city of New York, the low bidder being John Fox & Co., New York. We quote 6-in. and heavier at $72.30, New York; 4-in., $75.30, with $2 additional for Class A and gas pipe.

Old Material.—Prices have dropped on about 12 items because of little demand, the chief grades affected being borings, turnings, grate bars, stove plate and cast, the drop averaging about 75c. a ton. Because of the scarcity of ferrous raw materials, it is

believed that the market will rise as soon as a marked demand from consumers sets in.

Buying prices per gross ton, New York, follow:

Heavy melting steel	$20.00 to $21.00
Rerolling rails	32.00 to 33.00
Relaying rails, nominal	48.00 to 50.00
Steel car axles	34.00 to 35.00
Iron car axles	43.50 to 44.00
No. 1 railroad wrought	33.00 to 34.00
Wrought iron track	22.50 to 23.00
Forge fire	18.00 to 18.50
No. 1 yard wrought, long	27.00 to 27.50
Light iron	10.00 to 11.00
Cast borings (clean)	18.50 to 19.00
Machine-shop turnings	16.00 to 16.50
Mixed borings and turnings	15.00 to 15.50
Iron and steel pipe (1 in. min. diam., not under 2 ft. long)	22.00 to 22.50
Stove plate	30.50 to 31.00
Locomotive grate bars	28.50 to 29.00
Malleable cast (railroad)	29.00 to 30.00
Old car wheels	38.00 to 39.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton:

No. 1 machinery cast	$40.00 to $41.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	39.00 to 40.00
No. 1 heavy cast, not cupola size	30.00 to 31.00
No. 2 cast (radiators, cast boilers, etc.)	32.00 to 33.00

Philadelphia

PHILADELPHIA, March 30.

Higher prices for pig iron are predicted by the trade as a result of the removal of Government control of fuel prices on April 1. Blast furnace coke has sold as high as $12 per ton, Connellsville, for delivery in April, with $10 as the lowest price reported on any new transactions. If coke continues at these levels pig iron producers and sellers say that iron prices will surely advance. In the past week the market has shown greater strength, nearly all of the eastern Pennsylvania furnaces now quoting on the basis of $45, furnace, for second half, with about the same price applying on earlier deliveries. Some of the Virginia furnaces have advanced their prices $1 or to the basis of $43, furnace. The base prices apply to No. 2 plain iron, 1.75 to 2.25 per cent silicon, and the usual differentials for higher silicon are added.

The steel situation has not changed materially in the past week, except that there is a better inquiry for export, especially to Europe. Among sales for export last week were plates for England and Italy, the latter taking 2000 tons. Billets have also been sold to England and inquiries from that country indicate that the improved condition of exchange may result in further buying if the material can be had here. One of the important domestic sales of the week was upward of 10,000 tons of rim sections to a Detroit automobile wheel manufacturer for delivery in last half.

Domestic makers of ferromanganese have advanced their price to $200, delivered, for last half, and for prompt delivery $250, delivered, has been obtained on small lots. The scrap market is quiet, with some prices lower.

Coke.—Sales of furnace and foundry coke have been made through local sales offices in the past week at $12, Connellsville, for delivery after April 1, when Government control ends. The minimum price on either furnace or foundry coke reported here is $10, ovens, though some of the larger coke producers are reported to be protecting their regular customers at around $9. For the first time since the Government resumed control of coke prices it becomes fairly easy to obtain prompt shipments. Considerable selling of foundry grade has been done since the President announced that Government control would be relinquished, and these orders will be entered as of April 1 at $12 a ton.

Ferroalloys.—Domestic makers of ferromanganese announced last week that their price had been advanced from $180 to $200, delivered, but no sales are reported at the new figure. Sales of small lots for prompt delivery have been made up to $250, delivered. Foreign alloy is quoted at $195, seaboard, for second half. The high price of ferromanganese has revived trading in manganese ore. Some of a stock of Indian manganese ore which has been in storage at Staten Island, New York, for some time, was sold a few days ago at 80c. a unit and about 5000 tons more is under negotiation at the same price.

Pig Iron.—Increased costs due to higher prices for coke will result in further advances in pig iron, according to some local sellers. Virginia furnaces have advanced $1 to the basis of $43, furnace, and nearly all of the eastern Pennsylvania makers are now on the basis of $45, furnace, these prices in both instances applying to No. 2 plain iron, 1.75 to 2.25 per cent silicon, with the usual differentials for higher silicon. Some of the western Pennsylvania furnaces adhere to the basis of $42, furnace, but their freight rate is $2.80 to Philadelphia, and they have little or no iron to offer for first half. One of the eastern Pennsylvania furnaces last week booked considerable iron for regular customers at $43, base, and then advanced to $45. While there is no large demand for prompt iron, this is not surprising in view of the fact that some furnaces are anticipating on shipments. One Eastern furnace has shipped all of its first half iron in first quarter. The New England embargo, which was effective for several weeks, made it necessary for furnaces to divert shipment to other consumers, with the result that some foundries in this section have already received iron due them in April and May. In these cases the furnaces have agreed to bill the iron as if shipped according to regular schedule. Some furnaces are behind on deliveries. Sales offices here report that quite a number of consumers are not fully covered for last half, and that some are not covered for third quarter, and they predict another buying movement will start soon. The Westinghouse Electric & Mfg. Co., South Philadelphia, is in the market for 2000 tons of foundry iron for last half. Basic and low phosphorus iron are quiet. Prices quoted below on foundry iron generally apply to delivery over the remainder of the year.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace:

Eastern Pa., No. 2 X, 2.25 to 2.75 sil.	$46.05 to $47.35
East. Pa., No. 2 plain, 1.75 to 2.25 sil.	44.80 to 46.10
Virginia No. 2 plain, 1.75 to 2.25 sil.	47.10
Virginia No. 2 X, 2.25 to 2.75 sil.	48.35
Basic deliv. Eastern Pa.	44.80
Gray forge	43.00
Standard low phos. (f.o.b. furnace)	50.00
Malleable	46.75
Copper bearing low phos. (f.o.b. furnace)	47.00

Semi-Finished Steel.—Two sales of open-hearth rerolling billets of 1000 tons each were made last week by one of the leading independents at $65, Pittsburgh. Another Eastern producer still quotes $60, Pittsburgh. Forging billets are quoted from $75 to $85, Pittsburgh, though it is doubtful if sales have been made at the higher figure. We quote open-hearth rerolling billets, Philadelphia, at $64.10 to $69.10.

Plates.—Some of the Eastern mills which were handicapped in production by coal shortage are now getting better supplies of fuel and output is increasing. There is a fairly good demand for plates, but some consumers are not anxious to buy beyond immediate requirements at the 4c. price which most of the mills are asking. Inquiries come from locomotive builders, makers of pipe and the shipyards. A local exporter last week sold 2000 tons of plates for shipment to Italy, and there is inquiry for plates also from England, with prospects that business may be closed. The improvement in exchange has created new interest on the part of English buyers. The demand from Japan is not so urgent, due no doubt to the recent drop in commodity prices in that country, which has caused some hesitancy among buyers. A Philadelphia exporter has 15,000 tons of plates available for export, the price named being 4c., Pittsburgh. Light plates, 3/16 in., have been sold in 100-ton lots at 5c., Pittsburgh, but on heavier plates the market is quotable at 4c.

Structural Material.—Mills which name 4c., Pittsburgh, on plain material report that builders are seemingly not anxious to go ahead with construction projects on this basis. The mills have named this high price of discourage business, having on their order books all that they care to take at present.

Bars.—An Eastern maker has sold steel bars quite heavily for third quarter at 4.50c., base, Pittsburgh.

Another Eastern mill has sold 700 tons for export at 4.40c., Pittsburgh. Still another maker has booked a very large tonnage for second quarter at 4c., Pittsburgh. There is a demand for bars from England. One exporter has recently bought billets, which are being shipped to England, there to be rolled into bars and sold. An Eastern consumer paid 6c., Pittsburgh, for 350 tons of cold-drawn screw stock, with delivery in 60 to 90 days. Leading producers are quoting 3.85c. to 4.25c., in one case, and 4c. to 4.10c. in another, but are unable to make early delivery. An Eastern company has sold upward of 10,000 tons of rim sections to a Detroit automobile wheel manufacturer for delivery in last half. Spring steel has been sold for second quarter at 4.50c., Pittsburgh. The demand for small steel bars continues active, with the supply unequal to the need.

Wire Products.—An Eastern company has opened its books in a limited way on wire products for second quarter. It has sold wire nails at $4.50 per keg; cement coated nails at $4.10 per keg; plain wire at $4 per 100 lb.; barbed wire at $4.85 per 100 lb.; soft Bessemer rods at $75 and $80 per gross ton and high carbon rods at $100 to $110 per gross ton. Its wire department is running nearly full.

Sheets.—Blue annealed sheets have been sold for second quarter at 5c. to 5.25c., Pittsburgh, but galvanized and black sheets are still difficult to get.

Old Material.—The scrap market is weak. There is very little demand from mills and foundries. No. 1 heavy melting steel has been sold in small lots at $25, delivered. The Pennsylvania Railroad has asked for bids by April 6 on 15,000 tons of scrap, this being the largest accumulation that has been offered in some time. We quote old material for delivery at consuming points in this territory as follows:

No. 1 heavy melting steel	$25.00
Steel rails rerolling	$33.00 to 34.00
No. 1 low phos., heavy 0.04 and under	32.00 to 33.00
Car wheels	42.00 to 43.00
No. 1 railroad wrought	35.00 to 36.00
No. 1 yard wrought	30.00 to 31.00
No. 1 forge fire	21.50 to 22.00
Bundled skeleton	21.00 to 22.00
No. 1 busheling	24.00 to 25.00
No. 2 busheling	18.50 to 19.50
Turnings (short shoveling grade for blast furnace use)	18.50 to 19.50
Mixed borings and turnings (for blast furnace use)	17.50 to 18.50
Machine-shop turnings (for rolling mill and steel works use)	20.00 to 20.50
Heavy axle turnings (or equivalent)	23.00 to 24.00
Cast borings (for rolling mills)	20.00 to 21.00
Cast borings (for chemical plant)	24.00 to 25.00
No. 1 cast	38.00 to 40.00
Railroad grate bars	30.00 to 31.00
Stove plate	30.00 to 32.00
Railroad malleable	30.00 to 31.00
Wrought iron and soft steel pipes and tubes (new specifications)	25.00 to 26.00
Iron car axles	45.00 to 46.00
Steel car axles	42.00 to 44.00

Cincinnati

CINCINNATI, March 30.

Pig Iron.—Sales of pig iron during the week have been in the aggregate slightly above those of the past few weeks, one interest alone reporting over 5000 tons, while others report smaller totals. Most of the iron disposed of has been from southern furnaces, there apparently being little Northern iron offered. Inquiry is light, the only one of consequence being from a melter who asks for 800 tons of malleable a month for the rest of the year. Prices rule about the same as last week. A Southern company, which recently disposed of a round tonnage for second half delivery at $40 and subsequently withdrew, is understood to have again entered the market and will dispose of a limited amount. Another interest, which some time ago was quoting $44, is now offering iron at $41. Southern iron is still to be had at $40 for prompt shipment, though some furnaces are holding to the $42 price for first half and $43 for the second. A Virginia furnace, which had been selling at $42, has advanced to $43 and is offering iron for the remainder of the year. It is expected that all Virginia furnaces will soon be on the same basis. Southern Ohio iron is selling at $43 to $45, with very little available for first half. One Jackson county silvery furnace is now quoting $58 for 8 per cent. While the market is quiet, dealers expect another buying movement before long, as there are a number of melters in this territory who have not yet covered for last half. Sales noted during the week include one of 900 tons, two of 750 tons and two of 400 tons, all being Southern iron, and the prices paid ranging from $40 to $42.

Based on freight rates of $3.60 from Birmingham and $1.80 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base price)	$43.60 to $45.60
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	44.85 to 46.85
Ohio silvery, 8 per cent sil	56.80
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	44.80 to 46.80
Basic Northern	41.80
Malleable	46.80

Finished Material.—Demand for steel products continues heavy. This applies more particularly to sheets, and it is reported that one Detroit automobile manufacturer has endeavored to place an order for a big tonnage with a southern Ohio mill for shipment over the remainder of the year. While the offer was an attractive one, the mill was unable to take on the business, as it is sold up for the first half, and is booking orders from their regular customers only. Another mill in this district has withdrawn from the market altogether, and is bending every effort to keep production up to its highest point in order to catch up with orders now on its books. Some inquiries have been received by local sales agents for light rails and track fastenings, but with the sold up condition of the mills, it is doubtful whether this business will be placed just now. There is little being done here just now in the construction of new buildings, a number of projects being held up by the tightness of money and the high cost of material and labor. Bids will be opened on April 1 for the new Southern Railroad bridge over the Ohio River. This bridge calls for 14,000 tons of structural steel. A local forging plant has received an order from the Union Pacific for locomotive axles, but so far railroad business placed here has been practically negligible. Prices, on the whole, have not changed much in the past several weeks, though it is reported that one automobile body manufacturer had paid 16c. a lb. for 300 tons of sheets bought through a local broker. Local warehouses report deliveries somewhat improved, though this condition does not apply to nails and wire products, which are in exceptionally good demand and very difficult to obtain.

Coke.—With the removal of price restrictions on coke commencing April 1, the expected advance has already materialized. Contracts for Connellsville coke are now being made for the rest of the year at $10 a ton at the ovens, and in some cases as high as $11.50 is being asked. New River coke is being offered at $12. No quotations have been received from operators in the Wise County field, but it is expected that they will be on a par with those ruling in the Connellsville district. The demand for spot coke is still heavy, and price is a secondary consideration.

Old Material.—The scrap market is rather quiet, with prices remaining the same as last week. Considerable inquiry is being received for heavy melting steel and these are expected later to develop into orders. The fact that the mills are now getting a better supply of fuel and are steadily increasing production is looked upon as a favorable sign by dealers, who are predicting higher prices in the immediate future.

Per Gross Ton

Bundled sheet	$16.00 to $17.00
Old iron rails	27.00 to 28.00
Relaying rails, 50 lb. and up	46.00 to 47.00
Rerolling steel rails	30.00 to 31.00
Heavy melting steel	22.00 to 23.00
Steel rails for melting	24.00 to 25.00
Car wheels	29.00 to 30.00
No. 1 railroad wrought	26.00 to 27.00

Per Net Ton

Cast borings	$14.00 to $14.50
Steel turnings	12.00 to 12.50
Railroad cast	31.00 to 32.00
No. 1 machinery	35.00 to 36.00
Burnt scrap	22.00 to 23.00
Iron axles	29.50 to 30.00
Locomotive tires (smooth inside)	23.50 to 24.50
Pipes and flues	17.00 to 17.50
Malleable cast	23.00 to 23.50
Railroad tank and sheet	16.00 to 16.50

Cleveland

CLEVELAND, March 30.

Iron Ore.—The ore market showed a little more life during the past week. Several consumers divided fair-sized lots among different selling agents and one seller booked orders aggregating 100,000 tons. Sales were well distributed among the various districts outside of the East. However, two new inquiries have just developed from Eastern furnaces. One large selling agency is so well sold up for the season that it is no longer seeking business, but is still in shape to take some additional tonnage. Vesselmen are still withholding their boats for higher ore rates than the $1 per ton contract rate. Consequently little chartering for ore has been done.

We quote, delivered, lower Lake ports: Old range Bessemer, $7.45; old range non-Bessemer, $6.70; Mesaba Bessemer, $7.20; Mesaba non-Bessemer, $6.55.

Pig Iron.—The market is exceedingly dull, but prices are very firm at $43 Cleveland and $42 Valley furnace for No. 2 foundry and $43 for basic iron. Sales of the past week were lighter than for a long time, being confined to small lots of foundry iron. Two new inquiries, each for 2000 tons, have come out, one from Oil City, Pa., for July-October delivery, and the other from a Johnstown, Pa., radiator company for the last half. The purchase by the Westinghouse Electric & Mfg. Co. for its Cleveland plant was made from a Valley furnace and amounted to about 1600 tons. Some prompt shipment foundry iron is being sold in small lots in this territory by southern Ohio and western Pennsylvania furnaces at from $43 to $44.50 for No. 2. Steel making iron is quiet. A St. Louis territory consumer who recently inquired for a round tonnage of basic iron again took up the matter with a Cleveland seller during the week, making an offer of $43 for 6000 tons for the second quarter, the freight rate to the shipping point being $4.60. However, the furnace was unable to take on the additional tonnage. A Tennessee furnace which has just blown in is offering Southern iron for prompt shipment at $40 for 1.75 to 2.25 silicon, this being $1 per ton lower than the minimum price that has been prevailing in this district recently. The demand for Southern iron is light, as consumers are unwilling to pay the difference in price as compared with the Northern iron. Foundries are crowding furnaces for shipments, and owing to an improvement in the car situation there has been some reduction in the furnace stock piles this month.

We quote, delivered Cleveland, as follows, based on a 40c. switching charge for local iron, a $1.40 freight rate from Valley points and $5 from Birmingham:

Basic	$43.40
Northern No. 2 foundry, sil. 1.75 to 2.25	43.40
Southern foundry, sil. 2.25 to 2.75	$46.25 to 49.70
Gray forge	41.40
Ohio silvery, sil. 8 per cent	58.40
Standard low phos., Valley furnace	48.00 to 50.00

Coke.—With the removal of Government restrictions, April 1, Connellsville foundry coke is being freely offered at $10 for contracts for six months period from April 1 and also for the last half. Some sales have been made for the earlier delivery. No spot shipment prices are so far being named in this market. Shipments on contracts are still very slow. There is considerable inquiry for by-product coke, but an Indianapolis producer that has been making sales in this territory has withdrawn from the market.

Finished Material.—Reports from the steel trade regarding the volume of business are conflicting. With some sellers the volume of inquiry is as heavy as ever, but others report an easing up in the demand. This is particularly noticeable in plates for which the demand is considerably lighter than it has been. Warehouse business also shows some falling off. There is evidently a feeling among consumers that top prices have been reached and some are not so eager to place orders for future delivery as they were a short time ago, apparently withholding orders in order to take advantage of any price concession that may be made later. Production work in some plants is still being delayed because of lack of steel. The ruling quotation on steel plates, bars and structural material is 4c. and considerable business is being taken at that price for second quarter delivery. One mill will not quote April prices until it has figured out March costs. The demand for sheet bars is apparently as heavy as ever and another offer of $100 for 5000 tons of open-hearth sheet bars has been made to a Cleveland mill by a Detroit automobile manufacturer. This mill has adjusted open-hearth sheet bar prices with a number of additional customers at $80 for April shipments. We note the sale of 1000 tons of Bessemer wire rods at $80 for the second quarter delivery. Additional building projects in Cleveland planned for this year have been laid up because of the high cost of construction, and a charge that the cost of building is higher at present in Cleveland than any other city in the country will probably result in a thorough investigation of this subject. However, small building work requiring 100 tons of steel and under is still coming out in good volume. The Loomis Sieloff Co. has placed 120 tons with the Fort Pitt Bridge Co. for a foundry and the Ohio Brass Co., Mansfield, is inquiring for 1200 tons for an addition. The demand for sheets shows no easing up. Quotations range from 7.50c. to 9c. for black and 6c. to 6.75c. for blue annealed sheets for early shipment. One Valley mill is making allocations of sheets for third quarter shipment subject to prices fixed during that quarter. A Pittsburgh district mill has made another advance on wire nails to $4.75.

Cleveland warehouses quote steel bars at 3.27c. to 5c.; plates 3.57c. to 5c.; and structural material 3.70c. to 5.10c.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues heavy, but a number of manufacturers are operating at only 75 to 80 per cent of capacity because of a scarcity of steel. Orders are being placed quite freely by the railroads. Rivet specifications are heavy. A leading Cleveland manufacturer has just opened its books for second quarter contracts at regular prices.

Old Material.—The scrap market is a little more active, but shows a tendency toward weakness. Dealers show more anxiety to make sales than they did for a few weeks and heavy melting steel in lots around 1000 tons is being offered mills at $26 as compared with the $27.50 price which dealers were asking recently. Dealers point to feelers that have come from several mills during the past few days as an indication of a general buying movement shortly. Also several inquiries have come from Pennsylvania consumers for low phosphorus melting scrap. One large local consumer has purchased 7500 tons of cast borings and blast furnace turnings at $18 and has also made an exchange deal, trading sheet bars for compressed steel scrap on the basis of $23 for the latter. Cast scrap is very firm and scarce and quotations as high as $45 are being made on this grade. Quotations are unchanged.

We quote, per gross ton delivered consumers' yards in Cleveland and vicinity, as follows:

Heavy melting steel	$25.75 to $26.00
Steel rails, under 3 ft	29.00 to 30.00
Steel rails, rerolling	33.00 to 33.50
Iron rails	32.00 to 33.00
Iron car axles	41.00 to 42.00
Steel car axles	36.00 to 37.00
Low phos. melting scrap	30.00 to 31.00
Cast borings	18.25 to 18.50
Iron and steel turnings and drillings	15.25 to 15.75
Short turnings for blast furnaces	18.00 to 18.50
Compressed steel	22.50 to 23.00
Railroad wrought	29.00 to 30.00
Railroad malleable	33.00 to 33.50
Agricultural malleable	27.00 to 28.00
Steel axle turnings	22.50 to 23.00
Light bundled sheet scrap	18.00 to 18.50
No. 1 cast	39.00 to 40.00
No. 1 busheling	22.00 to 22.50
Drop forge flashings, over 10 in	17.85 to 18.25
Railroad grate bars	30.00 to 31.00
Stove plate	30.00 to 31.00

The Gammons-Holman Co., Manchester, Conn., capitalized for $50,000, divided into 500 shares of $100 par value each, has been incorporated to deal in tools, machinery, etc., and will begin business with a capital of $29,000. W. B. Gammons, C. W. Holman and H. O. Bowers, all of Manchester, are back of the firm.

San Francisco

SAN FRANCISCO, March 23.

With the arrival in this city this week of James O'Connell, president of the executive committee of the Metal Trades Council of the American Federation of Labor, another effort will be made to bring to an end the strike in the shipyards about San Francisco bay. The general trade condition shows no change.

Bars, Shapes and Plates.—The demand for bars continues heavy. They are now selling here at $4.65 for export and $4.90 for domestic use, and these prices are being quoted at the mills directly. While there is a steady demand for structurals, no new orders for large amounts are in the market. The Standard Oil Co. of California is preparing plans for an 18- or 20-story building opposite its present building on Sansome Street, but no announcement is made when work will begin. Jobbers report their stocks of plates and sheets are depleted and that they see little prospect of bettering this condition in the immediate future.

Wrought Pipe.—The steel pipe people say that conditions show no improvement. The mills are so far behind in their delivery that there seems no prospect of adequate supplies being delivered here for many months.

Cast-Iron Pipe.—While some of the iron and steel people of this section are predicting lower prices for all materials, the cast-iron pipe manufacturers say they see no indications of a reduction in their product. Even at present high prices, the demand is excellent and municipalities are constantly advertising for bids for supplies.

Pig Iron.—The demand for foundry pig iron has slackened, because the foundries and other melters have contracted for sufficient iron to take care of their requirements for the first half of the year. Larger users have placed contracts in some cases for the three quarters and a few for the entire year. The only demand now apparent is from small concerns which have not anticipated their needs.

Old Materials.—Scrap continues below the needs of the trade. It is said that for every ton delivered there is inquiry for two or three tons which cannot be delivered. No prices are given out, but it is reported that the mills are paying the dealers a premium above the agreed price of $26.50.

NEW BRITISH PATENT LAW

Changes in the Act Now in Effect—Licenses of Right

The new British patent act has gone into effect, excepting for one important and novel provision known as "licenses of right," and is worthy of study by those holding patents under the old law, and especially by those who contemplate seeking protection for their inventions in the United Kingdom.

The term of a patent is extended from 14 to 16 years, and this applies to all patents on applications dated Dec. 23, 1905, or later. The non-working period of four years given a patentee before his invention must be put to useful purpose within the United Kingdom, remains as before, but its operation is changed in important ways, especially in that the comptroller is given much the same power as that of a court in equity, and may extend the non-working period for reasons that appear sound to him. The grounds upon which a patent may be opposed are enlarged, including the ground that the invention has been published in any document published in the United Kingdom prior to the application, excepting that under certain conditions publication of an invention in a paper read before a learned society does not invalidate a patent subsequently applied for. This latter provision is held to be fraught with grave danger to the inventor.

As to the provision for the prevention of the abuse of monopoly rights, hitherto it has been considered that the grant of a patent is given in consideration of the communication of the new invention. It is now definitely enacted that "for the purpose of determining whether there has been an abuse of monopoly rights under a patent, it shall be taken that patents for new inventions are granted not only to encourage invention, but to secure that new inventions shall so far as possible be worked on a commercial scale in the United Kingdom without undue delay."

Abuse of Monopoly Rights Defined

The act provides five sets of conditions under which monopoly rights shall be deemed to have been abused: Non-working without satisfactory reason in the United Kingdom on a commercial scale after the expiration of four years from the date of the patents; where the patentee prevents or hinders the invention's being worked on a commercial scale by the importation of the patented article, or where he allows others to do so; if the demand for the patented article in the United Kingdom is not being met to an adequate extent and upon reasonable terms; if trade is prejudiced by the refusal of the patentee to grant licenses on reasonable terms, and it is in the public interests that licenses should be granted; or if any trade or industry is unfairly prejudiced by conditions imposed by the patentee.

If the comptroller is satisfied that there has been an abuse of monopoly rights he may act in either of several ways. He may grant a compulsory license, on such terms as he sees fit, including a term precluding the licensee from importing the patented article. In cases where the patentee cannot find the capital necessary to work the invention on a commercial scale n exclusive license may be granted, the effect of which is to transfer the rights of the patentee to the licensee, the amount of royalty to be paid to the patentee being determined by the comptroller. He may order the patent revoked, or he may order the patent to be endorsed "licenses of right," which is the innovation.

At any time after the sealing of the patent the patentee may apply to the comptroller for the patent to be endorsed with the words, "licenses of right." Such request must be advertised. The fact that the patentee has already granted a license is not a bar to the patent being so endorsed, providing that he has not contracted to grant further licenses. Any person, at any time, is entitled to a license under a patent so endorsed. The terms of such licenses, in default of agreement, may be settled by the comptroller on the application of either party, and he shall be governed by various considerations: He shall endeavor to secure the widest possible user of the invention in the United Kingdom consistent with the patentee deriving a reasonable advantage from his patent rights. He shall endeavor to secure to the patentee the maximum advantage consistent with the invention being worked by the licensee at a reasonable profit in the United Kingdom. He shall endeavor to secure equality of advantage among the several licensees, and for this purpose may, on due cause being shown, reduce the royalties or other payments accruing to the patentee under any license previously granted.

At the recent annual meeting of the Electric Hoist Manufacturers' Association held in New York J. B. Adams, of the Franklin Moore Co. Winsted, Conn., was elected chairman; R. H. McGredy, of the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., vice-chairman, and E. Donald Tolles, 52 Broadway, New York, secretary-treasurer. The next meeting will be held at No. 9 East 40th Street. New York, April 15.

The East St. Louis, Ill., plant of the American Steel Foundries, which had been shut down for the past 13 months, has been started up with a force of 600 men which will be increased to 1500 by the middle of the coming month. Railroad equipment is the chief product.

A Notable Railroad Car Purchase

A notable purchase in the railroad car field has been made by the Virginian Railroad, which has placed a contract with the Pressed Steel Car Co. for 1000 coal cars of no less than 120 tons capacity each. The railroad company had a number of sample cars of this carrying capacity built and it is on the basis of two years' experience with the car designed by the Pressed Steel Car Co. that the purchase has been made. Allowing for the heaping of the coal above the top of the sides and about 80,000 lb. of net weight of the car itself, each loaded car is likely to impose a weight on the rails and roadbed of 344,000 lb. The car has an inside length of 49 ft. 6 in., a width of 10 ft. 2¾ in. and a height from the rails of 11 ft. Its volume capacity is 3850 cu. ft. Each car will have two six-wheel cast steel trucks. The car body itself is reinforced on the inside so that there are no outside stakes and thus a greater width is obtained inside. Each car will require 16 tons of steel in addition to 3 tons for the axles.

It is the intention to operate the cars in 100 car trains. Owing to their weight there are few roads on which the cars could safely be run, and the railroad does not expect again to be embarrassed as it was in the period of Government control. For some time it has only been able to move 60 per cent of the amount of coal which it could carry from the coal fields at one end of the line to the terminal at Newport News because of the fact that much of its existing rolling stock has been scattered over the roads of the country. Another coal-carrying road is expected to buy cars of the same size.

New York Merger Completed

Westinghouse, Church, Kerr & Co., Inc., New York, has combined with Dwight P. Robinson & Co., Inc., New York, under the name of the latter company. The new company will occupy executive offices at 61 Broadway and will maintain engineering and designing offices in the Grand Central Palace, 125 East Forty-sixth Street, New York. Dwight P. Robinson, president of the new combination, was for many years president of the Stone & Webster Engineering Corporation, severing his connection in 1918 to form his own company, which has specialized in the design and construction of industrial plants, central power stations and hydro-electric plants.

Westinghouse, Church, Kerr & Co., Inc., established about 30 years ago, has specialized in the design and construction of industrial plants, railroad shops and terminals and industrial power plants. During the war the company constructed Camp Hill and Camp Stewart, Newport News, Va., Nitrate Plant No. 2, Muscle Shoals, Ala., extensions to the Rock Island Arsenal and other Government work. Stockholders in both companies will receive either cash or stock in the new combination. The personnel of both companies will be retained.

Miners and Operators Indicted

A Federal grand jury, sitting at Indianapolis, indicted some of the largest coal operators in this section as well as prominent union leaders. The indictment charges a general conspiracy among 125 operators and union miners in the central bituminous district to limit production and maintain excessive prices for coal. The Government prosecution, begun last December, comes on the eve of a new effort to negotiate a wage contract which will be acceptable to the miners and avert a new strike April 1. The miners threaten to walk out unless the indictments are withdrawn. Among those indicted are John L. Lewis, international president of the miners' union; Percy Tatlow, statistician; Edward Stewart, Indiana district president; Frank Farrington, Illinois district president; Francis S. Peabody, president of the Peabody Coal Co.; George B. Harrington, president the Wilmington & Franklin Coal Co.; Charles M. Moderwell, president C. M. Moderwell & Company; John T. Connery, Miami Coal Co. and other Chicago operators.

Harbison-Walker Refractories Co. Report.

The seventeenth annual report of the Harbison-Walker Refractories Co., Pittsburgh, covering the year ended Dec. 31, 1919, was issued last week. The balance sheet as of that date showed a surplus of $12,750,509.

H. W. Kroft, president, in submitting the report to the stockholders said in part: "The profits of the company for the year were considerably lower, due largely to the close relation of the refractory brick industry to the steel industry. Following the reduction in the selling price of steel, two reductions of ten per cent were made in the selling price of our product, the first taking effect on Jan. 1, and the second on April 1. Against this, however, there were no compensating reductions in operating expenses as wages were maintained during the entire year at the highest level. The stockholders' annual meeting will be held April 19.

British Iron and Steel Output in February

LONDON, ENGLAND, March 29, (*By Cable*).

The February production of pig iron for Great Britain was 645,000 gross tons and the steel output was 798,000 tons. This compares with 665,000 tons and 754,000 tons, respectively, for January. The monthly average for 1919 was 617,000 tons of pig iron and 658,000 tons of steel.

Truscon Steel Co. Stock Dividend

YOUNGSTOWN, OHIO, March 30.—Payable April 1, the Truscon Steel Co. has authorized a 20 per cent stock dividend on $1,444,650 outstanding common stock, which will thereby be increased to $1,733,580. Employees who have bought a total of 3300 shares of common will participate in the stock distribution. The company has a surplus as of Jan. 20 of $2,508,551.

The April issue of the Cleveland Twist Drill Co.'s *Drill Chips* is given up to a satire by the editor, C. H. Handerson, on the bill for the compulsory adoption of the metric system of weights and measures in the United States. The publishers have copies of the issue available for circulation in the metal-working trades. The drift of the article may be gathered from two sentences: "If the customer wants his lathe with gold legs and a hand-painted base on it, we'll give it to him—that's our spirit over here—but is that any reason why we should declare undecorated lathes illegal? That's what the metric chorus would have us do."

A meeting of graduates in engineering at Cornell University will be held on the evening of April 9 in the Engineering Societies Building, New York. The meeting is called by the Cornell Society of Civil Engineers, partly with the idea of forming a general Cornell engineering society, now that the different engineering schools at Cornell are to be combined into one general engineering college. The new dean of the combined college, Prof. Dexter S. Kimball, will be one of the speakers.

The Schuylkill Haven Rolling Mill, Schuylkill Haven, Pa., owned principally by H. H. Light and Thomas Quinn of Lebanon, has been sold to the National Steel Rolling Co., of Baltimore, a corporation of New York and Baltimore men, for a price said to approximate $120,000. Mr. Light will serve as a director of the new concern, which plans the early erection of a rolling mill in Baltimore. The Schuylkill Haven plant has a capacity of 1200 tons of iron bars or from 1600 to 1800 tons of steel bars.

The Replogle Steel Co. is rebuilding the Wharton blast furnaces at Wharton, N. J., which it now owns, and will put them in blast as soon as work is completed. Iron is being sold for delivery from these furnaces in second half.

IRON AND INDUSTRIAL STOCKS

Stronger Undertone in Market for Securities Noted During the Past Week

NEW YORK, March 30.

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Am. Can pf.....	— - 98	Nat. E. & S. com.	75¾ - 78
Am. C. & F. cm.	136¾ - 146⅜	N. Y. Air Brake.	105½ - 110
Am. C. & F. pf..	— - 115	Nova Scotia Steel	59 - 66⅞
Am. Loco. com..	99½ - 106½	Pittsburgh Stl. pf.	— - 88¼
Am. Ship. com...	— - 111	Press. Steel com.	98½ - 103⅞
Am. Ship. pf.....	— - 76	Ry. Stl. Spg. cm.	97½ - 99
Am. Stl. F. com.	46½ - 48½	Ry. Stl. Spg. pf..	— - 105
Am. Stl. F. pf...	— - 91⅜	Replogle Steel...	43 - 46½
Bald. Loco. com.	128¾ - 143¾	Republic com.....	103½ - 111⅝
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Beth. Steel com..	— - 92¾	Sloss com.....	73 - 77
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Crucible Stl. com.	234½ - 264⅞	U. S. Pipe com..	20 - 22⅝
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At its Sharon, Pa., plant, the American Steel & Wire Co. has broken ground for a welfare and employment office. It will be a two-story brick building, the first floor to house the employment offices, hospital and welfare room and the second a gymnasium.

British Iron and Steel Market

Welsh Miners Demand an Increase—Ferromanganese Advanced—Pig Iron Scarce

(*By Cable*)

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Official quotations for ferromanganese have been advanced to £35 for domestic consumption and to £40 for export. Alloy for May-June shipment has sold at £52.

The foreign ore market is quiet but prices are firm. Freights are easier with 35s. accepted for Bilbao ore at Middlesborough.

The steel situation is unaltered, and few makers are quoting. Welsh miners are demanding an increase of 40s. in their wages. The tin-plate market is quieter and prices are steadier, the market apparently awaiting developments in tin. Tin plates for prompt delivery are quoted at 75s. to 77s., basis, with May-June delivery at 75s. to 76s. and July-September, 71s. to 73s. The galvanized sheet market is strong with some makers asking up to £58 f.o.b. for No. 24 gage corrugated, but it is still possible to buy at £56.

We quote per gross ton, except when otherwise stated, f.o.b. maker's works, with American equivalent figured at $3.90 for £1, as follows:

	£	s.	£	s.	
Ship plates	25	0 to	30	0	$97.50 to $117.00
Boiler plates	28	10 to	33	0	109.20 to 128.70
Tees	25	10 to	32	0	99.45 to 124.80
Channels	24	15 to	31	5	96.52 to 121.87
Beams	24	10 to	30	0	95.55 to 117.00
Round bars, ¾ to 3 in.	27	0 to	32	10	111.30 to 126.75
Rails, 60 lb. and up	21	0 to	22	0	81.90 to 85.80
Billets	24	0 to	25	0	93.60 to 97.50
Sheet and tin plate bars, Welsh	30	0 to	35	0	117.00 to 136.50
Galvanized sheet, 24 g.	56	0 to	58	0	218.40 to 226.20
Tin plate, base box	3	11 to	3	17	13.84 to 15.01
Steel hoops	34	15 to	35	0	135.52 to 136.50
Cleveland basic iron	10	10			40.95
West Coast hematite	13	5			51.67
Cleveland No. 3 foundry (export to allies)	10	5			39.97
Ferromanganese	35	0 to	40	0	136.50 to 156.00

German Competition Not Important—Non-Delivery of French-Lorraine Steel—Pig Iron Higher

LONDON, ENGLAND, March 15.—Business generally continues brisk but much hampered by restricted supplies, congestion at ports, transport difficulties and scarcity of raw materials. The feature last week has been the advance in prices both of Cleveland and Hematite pig iron. These were of course expected, and in the case of Cleveland iron amount to 25s. per ton. The quotations are therefore now No. 1 Cleveland 207s. 6d. and No. 3 G. M. B. 200s. For business with France, Belgium and Italy, a premium of 5s. still rules. For other overseas destinations, however, prices can only be called nominal. Now that quotations have definitely advanced it is hoped that more business will result. Unfortunately practically all of the output is going directly into consumption so that it seems highly improbable that any important quantities of iron will be free for disposal even at the advanced figures. It is believed, however, that business will now be possible on forward contracts. Producers have been reluctant so far to put their selling prices up, but owing to the heavy and increasing cost have found it necessary.

The demand both for home consumers and for overseas continues as pressing as ever. As regards hematite, East Coast has been put up 40s. a ton which appears to be rather more than was expected. The quotation now is 260s. for East Coast mixed numbers for the home trade with 10s. more for France, Belgium and Italy, and as in the case of Cleveland prices for other foreign destinations can only be called nominal.

In regard to steel the price tendency is still upwards. North Eastern makers have advanced their figures by 25s. for heavy steel rails, 30s. for billets, 40s. for boilers plates, and 20s. for other kinds of material. An important factor is the car shortage which causes raw material to be scarce, and until this and the congestion at the ports, improves no alteration in general conditions is expected possible.

Export markets recently had been quieter, the present high prices apparently being a retarding factor with Indian buyers, for example. Reports have been current recently of a revival of German competition in steel, but not very much importance is attached to this. The business, it is understood, was done with foreign markets although through British merchants. This is believed to have been going on for some time, and is therefore not regarded as a new factor of importance in the situation. Some dislocation was threatened with the sudden steel strike in South Wales, but happily a settlement has been reached whereby the men will resume work, the points in dispute to be discussed afterwards.

The French works in Lorraine are in a state of chaos as a result of the operation having been in the hands of the French Government and military parties. British houses who had placed orders in June last year for delivery in three or four months have not received a single parcel. As a result, legal action is being taken by one leading British house against the French agents in London for breach of contract.

It is reported that the Steel Co. of Scotland has received an offer from the local group of ship-builders to purchase the whole of the ordinary shares of the company at £35 each. The directors recommend the shareholders to accept the offer. This company was formed in 1872 and has its head office in Glasgow. It owns the Hall Side Steel Works, Newton, Lanarkshire, and Blochairn Steel Works, Glasgow.

More than 1800 Delegates to Foreign Trade Convention at San Francisco

SAN FRANCISCO, March 25.—Recapitulation to-day shows 1830 delegates already promised for attendance at the Seventh National Foreign Trade Convention in this city May 12 to 15. The distribution is as follows: Eastern part of the United States, 500; Middle Western, 150; Southern, 100; Western, 970; the Orient, 50; Australia and New Zealand, 10; Central America, 15; Cuba, 10; South America, 15; Europe, 10. Of the Pacific Coast cities, San Francisco has 350 listed and Seattle, Portland, Los Angeles, Oakland, Tacoma and San Jose together have 620. The Philippine Government has already on the way to San Francisco an exhibit of Philippine products and industry that will occupy 650 ft. of space on the floor of the Civic Auditorium, where the sessions of the convention will be held. The Philippine exhibit will be made the basis of a permanent exhibit in San Francisco.

Manganese Imports in February

Manganese ore imports in February were only 4106 gross tons or the lowest for any month since early in 1915. In February, 1919, they were 19,579 tons and in January, this year, they were 21,463 tons. The total for eight months ended Feb. 29, 1920, has been 132,928 tons against 313,550 tons for the same eight months a year ago.

Ferromanganese imports in February, this year, were 2939 tons against 2752 tons per months in all of 1919. The total for the eight months ended Feb. 29, 1920, has been 23,420 tons against 12,164 tons for the same eight months a year ago.

The Curtis & Curtis Co., Bridgeport, Conn., manufacturer of the Forbes' pipe threading and cutting machine, has received a "Certificate of Merit" from the War Department for its patriotic service during the war. This citation is expressly for "making prompt deliveries and otherwise co-operating with the Construction Division of the Army."

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Ferromanganese	35	0 to	40	0	136.50 to	156.00

German Competition Not Important—Non-Delivery of French-Lorraine Steel—Pig Iron Higher

LONDON, ENGLAND, March 15.—Business generally continues brisk but much hampered by restricted supplies, congestion at ports, transport difficulties and scarcity of raw materials. The feature last week has been the advance in prices both of Cleveland and Hematite pig iron. These were of course expected, and in the case of Cleveland iron amount to 25s. per ton. The quotations are therefore now No. 1 Cleveland 207s. 6d. and No. 3 G. M. B. 200s. For business with France, Belgium and Italy, a premium of 5s. still rules. For other overseas destinations, however, prices can only be called nominal. Now that quotations have definitely advanced it is hoped that more business will result. Unfortunately practically all of the output is going directly into consumption so that it seems highly improbable that any important quantities of iron will be free for disposal even at the advanced figures. It is believed, however, that business will now be possible on forward contracts. Producers have been reluctant so far to put their selling prices up, but owing to the heavy and increasing cost have found it necessary.

The demand both for home consumers and for overseas continues as pressing as ever. As regards hematite, East Coast has been put up 40s. a ton which appears to be rather more than was expected. The quotation now is 260s. for East Coast mixed numbers for the home trade with 10s. more for France, Belgium and Italy, and as in the case of Cleveland prices for other foreign destinations can only be called nominal.

In regard to steel the price tendency is still upwards. North Eastern makers have advanced their figures by 25s. for heavy steel rails, 30s. for billets, 40s. for boilers plates, and 20s. for other kinds of material. An important factor is the car shortage which causes raw material to be scarce, and until this and the congestion at the ports, improves no alteration in general conditions is expected possible.

Export markets recently had been quieter, the present high prices apparently being a retarding factor with Indian buyers, for example. Reports have been current recently of a revival of German competition in steel, but not very much importance is attached to this. The business, it is understood, was done with foreign markets although through British merchants. This is believed to have been going on for some time, and is therefore not regarded as a new factor of importance in the situation. Some dislocation was threatened with the sudden steel strike in South Wales, but happily a settlement has been reached whereby the men will resume work, the points in dispute to be discussed afterwards.

The French works in Lorraine are in a state of chaos as a result of the operation having been in the hands of the French Government and military parties. British houses who had placed orders in June last year for delivery in three or four months have not received a single parcel. As a result, legal action is being taken by one leading British house against the French agents in London for breach of contract.

It is reported that the Steel Co. of Scotland has received an offer from the local group of ship-builders to purchase the whole of the ordinary shares of the company at £35 each. The directors recommend the shareholders to accept the offer. This company was formed in 1872 and has its head office in Glasgow. It owns the Hall Side Steel Works, Newton, Lanarkshire, and Blochairn Steel Works, Glasgow.

More than 1800 Delegates to Foreign Trade Convention at San Francisco

SAN FRANCISCO, March 25.—Recapitulation to-day shows 1830 delegates already promised for attendance at the Seventh National Foreign Trade Convention in this city May 12 to 15. The distribution is as follows: Eastern part of the United States, 500; Middle Western, 150; Southern, 100; Western, 970; the Orient, 50; Australia and New Zealand, 10; Central America, 15; Cuba, 10; South America, 15; Europe, 10. Of the Pacific Coast cities, San Francisco has 350 listed and Seattle, Portland, Los Angeles, Oakland, Tacoma and San Jose together have 620. The Philippine Government has already on the way to San Francisco an exhibit of Philippine products and industry that will occupy 650 ft. of space on the floor of the Civic Auditorium, where the sessions of the convention will be held. The Philippine exhibit will be made the basis of a permanent exhibit in San Francisco.

Manganese Imports in February

Manganese ore imports in February were only 4106 gross tons or the lowest for any month since early in 1915. In February, 1919, they were 19,579 tons and in January, this year, they were 21,463 tons. The total for eight months ended Feb. 29, 1920, has been 132,928 tons against 313,550 tons for the same eight months a year ago.

Ferromanganese imports in February, this year, were 2939 tons against 2752 tons per months in all of 1919. The total for the eight months ended Feb. 29, 1920, has been 23,420 tons against 12,164 tons for the same eight months a year ago.

The Curtis & Curtis Co., Bridgeport, Conn., manufacturer of the Forbes' pipe threading and cutting machine, has received a "Certificate of Merit" from the War Department for its patriotic service during the war. This citation is expressly for "making prompt deliveries and otherwise co-operating with the Construction Division of the Army."

EXPORTERS HOPEFUL

Small Tonnages Placed With Mills—Japanese Not Satisfied With Prices

Export trade with the Orient maintains much the same proportions that it has had for some time, although inquiries have fallen off with many exporters. Ability to place small tonnages with the mills, however, causes a slight feeling of optimism among exporters. While European markets continue to refrain from buying to any extent, a few orders for necessary material have been placed, one exporter having shipped small quantities of spiegeleisen to both Belgium and Holland and about 1000 tons of foundry iron to Italy. Another export house reports small shipments of billets to Belgium, but says that it has noticed that Germany is bidding from time to time on small quantities of material and seems willing to barter iron and steel for foodstuffs. In this connection, a representative of an exporter, who is in Germany, mentions that the Japanese have in several cases traded rice for iron and steel.

An export representative of a New York firm, who has been traveling in Japan for the past six months, says that he found considerable dissatisfaction on the part of buyers, who feel that American prices are too high and are often anxious to buy from England and Germany. An indirect cause of this desire he believed to be the fact that representatives of both of these countries have settled down among the Japanese, making good friends and valuable connections. In Yokohama he was told of a combination of buyers, formed to purchase iron and steel to the extent of $5,000,000 and another, similar combination of buyers, left out of the first combination, preparing to purchase iron and steel to this amount.

A concern representing several machinery and machine tool manufacturers for export reports a good business with the Orient and anticipates a growing demand for machinery and machine tools in India, to which they have recently shipped several thousand dollars' worth.

Belgian Cartel Dissolved

WASHINGTON, March 30.—Trade Commissioner C. E. Herring has reported to the Bureau of Domestic and Foreign Commerce from Brussels information relative to the virtual dissolution of the steel producers' cartel, which formerly was an important factor in the Belgian steel industry.

Mr. Herring says: "The association, it appears, will continue to exist, but its functions are now confined to the receiving of orders, without authority to accept them for individual firms or to fix prices. It is predicted that the organization will not last long in its present form, as its functions will tend to become purely formal. It is probable that the disorganized state of the Belgian metallurgical industry since the war has had much to do with the dissolution of this powerful syndicate. Since the armistice it has been practically impossible to fix prices for future delivery, as all costs of production have fluctuated greatly with the continued advance in the price of raw materials, labor, transportation, and overhead charges. Furthermore, there is no necessity for regulating production with a view to maintaining prices, as in pre-war days. Belgian metallurgical plants are overwhelmed with orders and overproduction is a remote prospect. The dissolution of the cartel, therefore, has not the same significance that it would have in a period of stabilized prices and normal production and demand."

Will Help American Exporter

WASHINGTON, March 30.—Organization of new international banking corporations, authorized under the Edge law, can now be completed as a result of the issuance of regulations by the Federal Reserve Board. In announcing the regulations, Governor W. P. G. Harding, of the board, expressed the belief that while the purpose of the law most emphasized was to permit American investors, by means of Federal corporations, to assist in the rehabilitation of Europe, yet the real result will be a broader one, namely, to provide for the establishment of a Federal system of international banking to compete with similar foreign institutions, and to afford to the American exporter and importer at all times a means of financing his foreign business. Governor Harding says that he believes the corporations will aid materially in the permanent development of the American export market.

Commission's Plan to Suppress Commercial Bribery

WASHINGTON, March 30.—As the result of a decision of the Circuit Court of Appeals of the United States that the Federal Trade Commission is without jurisdiction in a case involving commercial bribery, the commission has presented a new recommendation to Congress for the enactment of legislation dealing with the situation. The measure recommended for action prohibits not only the giving and offering, but the acceptance and solicitation of any gift or other consideration by an employee as an inducement or reward for aiding any act in relation to his employers' affairs or business or for bearing to show favor or disfavor to any person in relation to his employer's affairs or business. The bill also prohibits the giving of any such gifts or other consideration to members of agents' or employee's family, or to any other person having the use of his benefits direct or indirect. The bill has been pending for some time before the Senate Judiciary Committee of the House Interstate and Foreign Commerce.

In the absence of specific legislation on the subject, the Federal Trade Commission has held that so-called commercial bribery was an unfair method of competition and they would proceed against it accordingly.

The case in which the authority of the Commission was questioned involved the New Jersey Asbestos Co., against which a complaint was issued by the commission alleging that the company had, during the year 1918, been giving to employees of its customers, and prospective customers, liquors, cigars, meals, theater tickets, valuable presents, sums of money, and entertainments to induce them to influence their employers to purchase the company's products. The United States Circuit Court of Appeals for the second circuit held that the payment of money or the giving of valuable presents to an employee to influence his employers to make a contract of purchases is a fault justifying the discharge of the employee, but even in such cases it is held to be a matter between individuals and not one so affecting the public as to be within the jurisdiction of the commission under exising law.

Western Electric Improvements

The Western Electric Company has commenced the construction of additional buildings at its Chicago plant to cost $3,500,000. Machinery and tools will account for $1,500,000 more.

The National Steel Rolling Co., Keyser Building, Baltimore, Md., has arranged for a stock issue of $250,000 for expansion. It has taken over the plant of the Schuylkill Haven Rolling Mill, Schuylkill Haven, Pa., and will continue its operation as heretofore. The company has acquired property at West Baltimore, Md., and has plans under way for a new reclaiming steel bar mill at this location, to be electrically and oil operated, estimated to cost $100,000. This plant will have an initial capacity of about 9000 tons of material a year. It is expected to have the works ready for operation during August.

J. H. Malone has purchased the business of the Precision and Thread Grinder Mfg. Co., manufacturer of the Multi-Graduated Precision Grinder, Philadelphia. F. Rodger Imhoff will continue as field engineer, with headquarters in Detroit, and under his direction a force of salesmen and demonstrators will cover the United States and Canada.

PRODUCTION OF PIG IRON IN 1919

(From Special Statistical Bulletin No. 1 of American Iron and Steel Institute)

PRODUCTION OF PIG IRON BY GRADES, 1904–1919.

Years	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total. Gross tons.
1904.	2,483,104	9,098,659	3,827,229	263,529	550,836	273,676	16,497,033
1905.	4,105,179	12,407,116	4,758,038	635,236	727,817	358,904	22,992,380
1906.	5,018,674	13,840,518	4,773,011	699,701	597,420	377,867	25,307,191
1907.	5,375,219	13,231,620	5,151,209	920,290	683,167	419,856	25,781,361
1908.	4,010,144	7,216,976	3,637,622	414,957	457,164	199,155	15,936,018
1909.	8,250,225	10,557,370	5,322,415	658,048	725,624	281,789	25,795,471
1910.	9,084,608	11,245,642	5,260,447	843,123	564,157	305,590	27,303,567
1911.	8,520,020	9,409,303	4,468,940	612,533	408,841	229,910	23,649,547
1912.	11,417,886	11,664,015	5,073,873	825,643	469,183	276,337	29,726,937
1913.	12,536,693	11,590,113	5,220,343	993,736	324,407	300,860	30,966,152
1914.	9,670,687	7,859,127	4,533,254	671,771	361,651	235,754	23,332,244
1915.	13,093,214	10,523,306	4,843,899	829,921	316,214	309,659	29,916,213
1916.	17,684,087	14,422,457	5,553,644	921,486	348,344	504,779	39,434,797
1917.	17,671,662	13,714,732	5,328,258	1,015,579	345,707	545,278	38,621,216
1918.	18,646,174	13,024,966	5,145,260	1,117,914	393,932	726,398	39,054,644
1919.	14,494,131	9,975,934	4,916,758	1,009,049	271,286	348,206	31,015,364

PRODUCTION OF PIG IRON BY STATES, 1918–1919.

States.	Production—Gross tons.					
	1919.	Per cent.	1918.	Per cent.	Increase.	Per cent. increase.
Pennsylvania	12,276,585	39.58	15,198,271	38.91	*2,921,686	*19.22
Ohio	7,102,627	22.90	8,764,132	22.44	*1,661,505	*18.96
Indiana, Michigan	2,715,659	8.76	3,073,599	7.87	*357,940	*11.65
Illinois	2,558,213	8.25	3,440,307	8.81	*882,094	*25.64
Alabama	2,130,092	6.87	2,587,852	6.63	*457,760	*17.69
New York, New Jersey	2,070,288	6.68	2,871,118	7.35	*800,830	*27.89
Wisconsin, Minnesota	605,619	1.95	750,366	1.92	*144,747	*19.29
W. Va., Ga., Ky., Texas	413,091	1.33	594,675	1.52	*181,584	*30.53
Virginia	319,409	1.03	513,737	1.32	*194,328	*37.82
Mo., Iowa, Colo., Mont., Wash., Oregon, Cal.	375,587	1.21	504,463	1.29	*128,876	*25.55
Maryland	244,002	.79	373,817	.96	*129,815	*34.73
Tennessee	190,514	.61	369,822	.95	*179,308	*48.48
Maine, Mass., Conn.	13,678	.04	12,485	.03	1,193	9.56
Total	31,015,364	100.00	39,054,644	100.00	*8,039,280	*20.58

* Decrease.

PRODUCTION OF PIG IRON BY STATES, 1915–1919.

States.	1915.	1916.	1917.	1918.	1919.
Maine, Mass., Conn.	7,802	5,719	10,527	12,485	13,678
New York, New Jersey	2,104,780	2,352,535	2,417,527	2,871,118	2,070,288
Pennsylvania	12,790,668	16,506,284	15,539,728	15,198,271	12,276,585
Maryland	251,548	501,452	422,212	373,817	244,002
Virginia	251,346	399,885	520,311	513,737	319,409
Alabama	2,049,453	2,762,885	2,953,708	2,587,852	2,130,092
W. Va., Ga., Ky., Texas	291,040	554,590	561,951	594,675	413,091
Tennessee	177,729	355,374	369,951	369,822	190,514
Ohio	6,912,962	8,602,895	8,518,603	8,764,132	7,102,627
Illinois	2,447,220	3,922,512	3,456,915	3,440,307	2,558,213
Indiana, Michigan	1,986,778	2,221,708	2,657,503	3,073,599	2,715,659
Wisconsin, Minnesota	372,966	811,325	738,541	750,366	605,619
Mo., Iowa, Col., Mont., Wash., Oregon, Cal.	271,921	437,633	453,742	504,463	375,587
Total	29,916,213	39,434,797	38,621,216	39,054,644	31,015,364

PRODUCTION OF COLD AND HOT AND WARM BLAST CHARCOAL PIG IRON, 1915-1919.

Kinds of iron.	1915.	1916.	1917.	1918.	1919.
Cold blast	5,302	5,323	5,219	4,209	2,113
Hot and warm blast*	290,850	367,088	371,306	344,668	324,984
Total.....Gross tons.	296,152	372,411	†376,525	†348,877	327,097

* Includes iron made with charcoal and electricity in 1915.

† Includes small tonnage of pig iron made with charcoal and coke mixed in 1917 and 1918.

PRODUCTION OF PIG IRON BY GRADES, 1918–1919, SHOWING INCREASE OR DECREASE BY GRADES.

Grades.	1919.	Per cent.	1918.	Per cent.	Increase.	Per cent.
Basic	14,494,131	46.73	18,646,174	47.75	*4,152,043	*22.27
Bessemer and low phosphorus	9,975,934	32.17	13,024,966	33.35	*3,049,032	*23.41
Foundry and ferro-silicon	4,916,758	15.85	5,145,260	13.17	*228,502	*4.44
Malleable	1,009,049	3.25	1,117,914	2.86	*108,865	*9.74
Forge	271,286	.88	393,932	1.01	*122,646	*31.13
Spiegeleisen	84,246	.27	283,853	.73	*199,607	*70.32
Ferro-manganese	185,357	.60	333,027	.85	*147,670	*44.34
All other	78,603	.25	109,518	.28	*30,915	*28.23
Total	31,015,364	100.00	39,054,644	100.00	*8,039,280	*20.58

*Decrease.

PIG IRON MADE FOR SALE BY GRADES IN 1919.

States.	Basic.	Bessemer.	Foundry.	Malleable.	Forge.	All other.	Total. Gross tons.
Maine, Mass., Conn.	.....	.....	13,097	.....	.....	72	13,169
N.Y., N.J., Md.	109,596	97,146	814,111	147,605	8,931	10,284	1,187,673
Pennsylvania	686,764	683,381	834,064	126,933	65,262	88,127	2,484,531
Va., W. Va., Ala.	91,758	2,742	1,381,157	.....	8,425	28,651	1,512,733
Ky., Tenn. Tex.	314	29,606	237,142	.....	.....	5,539	272,691
Ohio	538,702	73,139	741,901	334,602	17,815	4,662	1,710,821
Ind., Ill.	173,588	121,936	106,910	212,698	.....	.....	615,132
Mich., Wis., Minn., Mo., Iowa, Col., Ore., Wash., California	13,040	10,419	688,852	177,390	.....	3,776	893,477
Total	1,613,762	1,018,459	4,817,234	999,228	100,433	141,111	8,690,227

METHODS BY WHICH ALL PIG IRON WAS CAST OR DELIVERED.

States.	Molten condition.	Sand cast.	Machine cast.	Chill cast.	Direct castings.	Total. Gross tons.
Maine, Mass., Conn.	.....	13,678	.....	.....	.....	13,678
N. Y., N. J., Maryland	952,519	507,217	733,561	120,074	919	2,314,290
Pennsylvania	8,032,472	846,909	3,172,636	214,963	9,605	12,276,585
Va., W. Va., Ala., Ky., Tenn., Texas	1,005,547	1,571,963	270,386	193,889	11,321	3,053,106
Ohio	4,084,835	547,517	2,219,718	244,603	5,954	7,102,627
Ind., Ill., Mich., Wis., Minn., Mo., Ia., Col., Wash., Oregon, California	4,142,344	474,878	1,589,409	46,025	2,422	6,255,078
Total	18,217,717	3,962,162	7,985,710	819,554	30,221	31,015,364

METHODS BY WHICH BASIC PIG IRON WAS CAST OR DELIVERED IN 1919.

States.	Sand cast, machine cast, chill cast, etc.	Molten condition.	Total. Gross tons.
New York, New Jersey	176,072	560,253	736,325
Pennsylvania	1,734,686	4,892,526	6,627,212
West Virginia, Alabama, Kentucky	162,866	904,232	1,067,098
Ohio	868,740	1,673,229	2,541,969
Indiana, Illinois, Michigan, Minnesota, Missouri, Colorado, Washington	629,781	2,891,746	3,521,527
Total	3,572,145	10,921,986	14,494,131

METHODS BY WHICH BESSEMER AND LOW-PHOSPHORUS PIG IRON WAS CAST OR DELIVERED IN 1919.

States.	Sand cast, machine cast, chill cast, etc.	Molten condition.	Total. Gross tons.
New York, New Jersey, Maryland	183,127	392,266	575,393
Pennsylvania	1,164,067	3,138,104	4,302,171
West Virginia, Kentucky, Tennessee, Alabama	153,726	90,941	244,667
Ohio	956,149	2,411,187	3,367,336
Illinois, Wisconsin, Colorado	247,544	1,238,823	1,486,367
Total	2,704,613	7,271,321	9,975,934

Non-Ferrous Metals

The Week's Prices

Cents Per Pound for Early Delivery

	Copper New York		Tin	Lead		Zinc	
March	Lake	Electrolytic	New York	New York	St. Louis	New York	St. Louis
24	18.75	18.50	60.50	9.00	8.75	8.80	8.45
25	18.75	18.62½	59.00	9.00	8.75	8.70	8.35
26	19.00	18.75	61.00	9.00	8.75	8.75	8.40
27	19.00	18.75	....	9.00	8.75	8.80	8.45
29	19.25	19.00	62.62½	9.00	8.75	8.85	8.50
30	19.25	19.00	63.75	9.00	8.75	8.85	8.50

NEW YORK, March 30.

There is considerably more activity in several of the markets. Buying of copper is increasing decidedly and prices are advancing. The tin market is featured by active purchases by consumers and prices continue strong. The lead market is very quiet and easier. The zinc market has been less erratic but demand has not increased. Antimony is inactive and firm.

New York

Copper.—The predicted buying movement in copper is evidently in full swing, as a large business is reported to have been done for domestic consumption as well as for export. The tendency of prices, of course, has been upward until to-day electrolytic copper for early delivery is firmly held at 19c., New York, with Lake at 19.25c. In some cases June delivery is at a slight premium above these levels. It is understood that export business has been transacted also at a premium. So confident are the leading producers of the future of the market that they are in most cases unwilling to quote for third quarter unless circumstances warrant. Sales for export are reported as increasing and the plan for a revolving fund to finance such business seems to be nearer consummation.

Tin.—An excellent business up to Saturday, March 27, was done in tin, sales averaging 250 tons or more each day, mostly for nearby delivery, although there were good purchases for future shipment. Dealers, who lately have been cutting prices, have been forced to cover and the market has gone back, largely into the hands of importers. The buying referred to was general, both on the part of consumers and dealers, with consumers manifesting more and more interest daily. The large consumers are apparently covered to the end of June and are exhibiting more interest in futures, particularly May-June shipment from the East. Yesterday, March 29, there was a particularly good demand, mostly for prompt shipment, sales being made from 62.50c. to 63c., New York, and much more business could have been done. Supplies are being concentrated in the hands of strong holders who are willing to sell only part of their holdings at a time. Spot Straits tin to-day is quoted at 63.75c., New York. In London prices advanced to-day £13 to £14 per ton, with Straits tin quoted there at £359 5s. per ton. Arrivals thus far this month have been 3500 tons, with 2890 tons reported afloat. Exports of tin have been 65 tons, of which 50 tons has gone to Hamburg and 15 tons to Japan.

Lead.—The market continues quiet and easy, with the metal obtainable for early delivery in the outside market at 8.75c., St. Louis, or 9c., New York. The quotation of the leading interest is unchanged at 9c., St. Louis, or 9.25c., New York. Consumption continues very heavy and it is stated that the improvement in output is only slight. The easier condition in the market is regarded also as temporary, caused largely by the release into consumption of large quantities of metal in transit.

Zinc.—Prime Western for early and second quarter delivery is obtainable and has sold to-day at 8.50c., St. Louis, or 8.85c., New York, but demand is only light either for domestic or foreign consumption. Some producers are out of the market, refusing to sell at present prices. The market is less erratic in values, although it has followed to a certain extent the fluctuations in London, but the influences from that quarter are not as strong as in the recent past.

Antimony.—The market is quiet and unchanged, with wholesale lots of the better grades quoted at 11.50c., New York, for early delivery.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is unchanged at 33c., New York, from the leading interest or 31c. from outside sellers, these values applying to wholesale lots for early delivery.

Old Metals.—The market is firmer with a tendency toward higher prices. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	19.00
Copper, heavy and wire	18.00
Copper, light and bottoms	16.25
Brass, heavy	14.00
Brass, light	10.00
Heavy machine composition	18.25
No. 1 yellow rod brass turnings	11.50
No. 1 red brass or compositio nturnings	16.00
Lead, heavy	8.25
Lead, tea	6.50
Zinc	6.50

Chicago

March 30.—Copper is fairly quiet, although there have been numerous sales for prompt delivery. Tin has been very strong for the past two or three days, and is in good demand. It has advanced slightly to 63.50c. Lead and spelter are quiet and weak, both having declined. Antimony is quiet and stationary. The old metals are unchanged. We quote Lake copper 19.25c. for carloads, tin 63.50c., lead 8.75c., spelter 8.50c. and antimony 12c. On old metals we quote copper wires, crucible shapes, 15.50c.; copper clips, 15.25c.; copper bottoms, 14c.; red brass, 15.50c.; yellow brass, 11.25c.; lead pipe, 7c.; zinc, 6.25c.; pewter, No. 1, 37.50c.; tinfoil, 40c., and block tin, 50c., all these being buying prices for less than carload lots.

St. Louis

March 29.—The nonferrous markets have been rather quiet, with no evidence of either strength or weakness. On car lots the quotations at closing were: Lead, 8.70c.; spelter, 8.50c. In less than car lots the prices were: Lead, 9.50c.; spelter, 10c.; tin, 66c.; copper, 20c.; antimony, 13.50c. In the Joplin district ore prices were fairly well maintained with lead ore, basis 80 per cent, selling at $107.50; zinc blende, basis 60 per cent, $52.50 with a top price for premium ores of $53.50, and calamine, basis 40 per cent, $35 to $40 per ton with the average at $40 because of premium ores. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 10.50c.; light copper, 13c.; heavy red brass, 15c.; heavy copper and copper wire, 16c.; zinc, 5c.; lead, 6c.; pewter, 35c.; tinfoil, 43c.; tea lead, 3c.; aluminum, 24c.

Fairbanks, Morse & Co. to Handle Cranes

The Chesapeake Iron Works, Baltimore, manufacturer of Chesapeake cranes, has placed the agency for the New York territory with Fairbanks, Morse & Co., 30 Church Street, New York, where they will be handled by R. H. Snider. The office of the Chesapeake Iron Works, 233 Broadway, in charge of H. L. Mode, will be discontinued. H. E. Hogrebe, designer of the Chesapeake crane and in charge of production for the past three years, has severed his connection. Mr. Hogrebe was formerly chief engineer for the Niles-Bement-Pond Co.

The Lebanon Steel Foundry, Lebanon, Pa., is installing electric equipment needed for the operation of an additional electric steel furnace, now being constructed.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, with revisions effective Jan. 1, 1920, in carloads, to points named, per 100 lb., are as follows: New York, 27c.; Philadelphia, 25c.; Boston, 29½c.; Buffalo, 21c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49.5½c.; Denver, 99c.; Omaha, 59c.; minimum carload 80,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, $1.25; minimum carload 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is $1.315, minimum carload 40,000 lb.; and $1.25, minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. Jacksonville, Fla., all rail, car lots, 41.5c.; less 59c.; rail and water car lots, 34.5c.; less 46.5c. A 3 per cent transportation tax applies. On iron and steel items not noted above rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural size, 2.45c. to 4c.

Wire Products

Wire nails, $3.25 to $4.00 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.50 and shorter than 1 in., $2.00. Bright basic wire, $3 to $3.50 per 100 lb.; annealed fence wire, Nos. 6 to 9, $3 to $3.50; galvanized wire, $3.70 to $3.95; galvanized barbed wire and fence staples, $4.10 to $4.45; painted barbed wire, $3.40 to $3.75; polished fence staples, $3.40 to $4.50; cement-coated nails, per count keg, $2.85 to $3.75; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....$4.50 base
Large boiler rivets .....$4.60 base
Small rivets .....50 per cent off list
Small machine bolts, rolled threads .....40, 10 and 5 per cent off list
Same sizes in cut threads.....40 and 5 per cent off list
Longer and larger sizes of machine bolts .....30 and 10 per cent off list
Carriage bolts, ⅜ in. x 6 in.:
Smaller and shorter, rolled threads.40 and 5 per cent off list
Cut threads .....30 and 10 per cent off list
Longer and larger sizes.....30 per cent off list
Lag bolts .....50 per cent off list
Plow bolts, Nos. 1, 2 and 3 head.....40 per cent off list
Other style heads .....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:
Smaller and shorter.....35 per cent off list
Longer and larger sizes.....25 per cent off list
Hot pressed and cold pressed sq. or hex. blank nuts .....2c. off list
Tapped nuts .....$1.75 off list
Semi-finished hex. nuts, U. S. S. and S. A. E.:
⅝-in. and larger .....60 and 5 per cent off list
9/16-in. and smaller.....70 and 5 per cent off list
9/16-in. and smaller A. L. A. M. or S. A. E.....70, 10 and 5 per cent off list
Stove bolts in packages.....70 and 10 per cent off list
Stove bolts in bulk.....70, 10 and 2½ per cent off list
Tire bolts .....55 and 10 per cent off list
Track bolts .....6c. base

One cent per lb. extra for less than 200 kegs. Rivets in 100-lb. kegs 25c. extra.

All prices carry standard extras f.o.b. Pittsburgh.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $52 to $70; chain rods, $75 to $80; screw rivet and bolt rods and other rods of that character, $65 to $70. Prices on high carbon rods are irregular. They range from $75 to $100, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, ½ to 9/16 in. and larger, $4.00 per 100 lb. in lots of 200 kegs, of 200 lb. each or more; spikes, ⅝-in. and 7/16-in., $4.25; 5/16-in., $5; track bolts, $4.90 to $5. Boat and barge spikes, $4.50 per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Tie plates, $3 to $4 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $13.80 per package; 8-lb. coating, I. C., $14.10; 12-lb. coating, I. C., $15.80; 15-lb. coating, I. C., $16.80; 20-lb. coating, I. C., $18.05; 25-lb. coating, I. C., $19.30; 30-lb. coating, I. C., $20.30; 35-lb. coating, I. C., $21.30; 40-lb. coating, I. C., $22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.35c. to 4.00c. from mill. Common bar iron, 4.50c.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, discounts on steel pipe, applying as from Jan. 14, 1920, and on iron pipe from Jan. 7, 1920:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	47	20½	⅛ and ¼	1	+25
½	51	36½	⅜	25½	+ 1½
¾ to 3	54	41½	½	29½	11½
			¾ to 1½	34½	18½
			2 and 2½	33½	17½

Lap Weld

2	47	34½	1¼	34½	9½
2½ to 6	50	37½	1½	31½	17½
7 to 12	47	33½	2	28½	14½
13 and 14	37½		2½ to 6	30½	17½
15	35		7 to 12	27½	14½

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	43	25½	⅛	+7	+40
½	48	35½	⅜	23½	6½
¾ to 1½	52	39½	½	28½	15½
2 to 3	53	40½	¾ to 1½	34½	19½
			2 and 2½	34½	19½

Lap Weld, extra strong, plain ends

2	45	33½	1¼	21½	6½
2½ to 4	48	36½	1½	27½	13½
4½ to 6	47	35½	2	29½	16½
7 to 8	43	29½	2½ to 4	31½	19½
9 to 12	38	24½	4½ to 6	30½	18½
			7 to 8	22½	10½
			9 to 12	17½	5½

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized iron pipes have been nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
3½ to 4½ in.	40½	1¾ and 1⅞ in.	+20
2½ to 3¼ in.	30½	2 and 2¼ in.	+10
2¼ in.	24	2½ and 2¾ in.	+ 1
1¾ to 2 in.	19½	3 and 3¼ in.	— 1½
		3½, 4 and 4½ in.	— 8

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton		Per Net Ton	
1 in.	$327	1¾ in.	$207
1¼ in.	267	2 to 2½ in.	177
1⅜ in.	257	2¾ to 3¾ in.	167
1½ in.	207	4 in.	187
		4½ to 5 in.	207

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiations.

Sheets

Prices of the Steel Corporation for mill shipments on sheets of United States standard gage in carloads and larger lots for indefinite delivery are given in the left-hand column. For reasonably prompt delivery, mills have no trouble in getting prices quoted in the right-hand column, or even higher prices.

	Cents per lb.
Blue Annealed—Bessemer	
No. 8 and heavier	3.50 to 5.95
Nos. 9 and 10 (base)	3.55 to 6.00
Nos. 11 and 12	3.60 to 6.05
Nos. 13 and 14	3.65 to 6.10
Nos. 15 and 16	3.75 to 6.20
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	4.15 to 6.30
Nos. 22 to 24	4.20 to 6.35
Nos. 25 and 26	4.25 to 6.40
No. 27	4.30 to 6.45
No. 28 (base)	4.35 to 6.50
No. 29	4.45 to 6.60
No. 30	4.55 to 6.70
Galvanized, Black Sheet Gage—Bessemer	
Nos. 10 and 11	4.70 to 7.50
Nos. 12 to 14	4.80 to 7.60
Nos. 15 and 16	4.95 to 7.75
Nos. 17 to 21	5.10 to 7.90
Nos. 22 to 24	5.25 to 8.05
Nos. 25 and 26	5.40 to 8.20
No. 27	5.55 to 8.35
No. 28 (base)	5.70 to 8.50
No. 29	5.95 to 8.75
No. 30	6.20 to 9.00
Tin-Mill Black Plate—Bessemer	
Nos. 15 and 16	4.15 to 6.15
Nos. 17 to 21	4.20 to 6.20
Nos. 22 to 24	4.25 to 6.25
Nos. 25 to 27	4.30 to 6.30
No. 28 (base)	4.35 to 6.35
No. 29	4.40 to 6.40
No. 30	4.40 to 6.40
Nos. 30½ and 31	4.45 to 6.45

The British Institute of Metals

Valuable Results of Corrosion Research—Papers on Casting High Tensile Brass and on Removing Internal Stress by Low Temperature Annealing

(From Our Own Correspondent)

LONDON, March 13.—At the spring meeting of the Institute of Metals, held in the building of the Institution of Mechanical Engineers, London, on March 11 and 12, the program included some 13 papers, of which those noticed herewith are of general interest to metallurgists, in view of their bearing on engineering practice.

At the first session, the retiring president, Prof. H. C. H. Carpenter of the Royal School of Mines, inducted into the presidential chair Engineer-Vice-Admiral Sir George Goodwin, the engineer-in-chief of the fleet, whose address dealt with developments in naval engineering and metallurgy during and before the war.

The report of the council disclosed remarkable progress, especially in the way of membership, which has nearly doubled in the last three years, and in the formation of local sections at Sheffield and Glasgow in 1918 and 1919, following the example of Birmingham in 1910. It may be added that a number of industrial corporations contribute substantially to the financial support of the institute, and that the majority of the promoters of the recently formed British Non-Ferrous Metals Research Association were prominent members of the institute.

Presidential Address

The new president pointed out that the British navy is the largest individual user in the world of non-ferrous metals, and the standing problem that has been before naval designing engineers for many years has been the reduction of machinery weight coupled with the reduction of fuel consumption and increased durability and reliability. The position at present reached as a result of the cumulative endeavor during the last few decades is that in the latest British battle cruiser it is hoped to obtain 144,000 shaft hp. on a total machinery weight, including water, of 4750 tons; that is, at the rate of 74 lb. per shaft hp. The most recent British destroyers have repeatedly developed over 28,000 shaft hp. on a weight of 32 lb. per shaft hp.

After referring to the development of water-tube boilers, the steam turbine and oil fuel, the president observed that it was gratifying to notice that the large sums spent on naval engineering, in preparation for the destructive work of war, will probably be fully repaid by the great advances in general engineering which the peculiar problems of naval design have stimulated.

Other subjects covered by the presidential address are condenser tubes, turbine blading, propeller blade material, bearing metals and the Mitchell thrust bearing, oil engine materials, and the manufacture of shell bands. The use of non-rusting steel to provide lighter working barrels of the cylinders of oil engines in the navy is under consideration, and this appears to have been made practicable by the use of piston rings of copper-zinc alloy, shaped in the form of obturator rings.

Condenser Tube Corrosion

The authors of the fifth report to the corrosion committee, presented at the first session, are Guy D. Bengough, R. M. Jones and Ruth Pirret, and their work is confined to the corrosion of condenser tubes (mainly 70 : 30 brass). The report is a study of the practical problems of corrosion in condensers under service conditions, employing either sea water or fresh water. It is divided into four sections.

The first section deals with the diagnosis of condenser tube corrosion. The procedure to be followed in withdrawing and preparing a tube for examination is described, also the symptoms or appearances within the tube which correspond to each of the five main types into which the practical problems of corrosion under fresh water or sea water conditions have been classified. The importance of additional information concerning (*a*) the water supply and (*b*) the corroded tubes towards elucidating the cause of corrosion is shown and emphasized. The conditions existing within the plant frequently vary widely from time to time, and it is shown that although the conditions which favor accelerated corrosion may be present for but short periods at irregular intervals, and consequently may not be easily detected, the effect on the tubes may still be very serious. Also in certain cases accelerated, localized corrosion may persist after the initiating conditions have disappeared.

The second section considers certain features in the structure of condenser tubes. Attention is principally directed to the presence on the tubes of a surface layer consisting of structureless and highly distorted metal. This layer has undoubtedly a greater resistance to corrosion by saline and fresh waters than the underlying crystalline metal, so that whenever this layer is penetrated corrosion will proceed at an increased rate. The layer has been stripped from a number of tubes of different composition. Its thickness is usually of the order of 0.01 mm., and indications have been obtained that its composition may be somewhat different from that of the underlying metal.

In the third section the five main types of brass condenser tube corrosion are considered separately in detail.

Type I: General Thinning.—This type may be considered as an accelerated form of the complete corrosion which normally occurs in saline solutions, in so far as the tube is gradually and uniformly reduced in thickness. The rate of ordinary complete corrosion is too slow to be of any serious consequence in practice; tubes almost always fail in practice by local actfon of some kind long before ordinary complete corrosion has seriously reduced the thickness of the tube. Rapid general thinning, however, is essentially a fresh water phenomenon and is usually associated with the presence of free acid in the water supply. The results of tests on ten samples of tube of widely different composition in hydrochloric acid of concentration 3 parts in 100,000 at ordinary temperature show that in six weeks all tubes had lost from 2 to 4 per cent in thickness—ample evidence of the serious effect of acid in the water supply upon the life of condenser tubes. Proper neutralization, preferably at the source of contamination, is an effective remedy. Regular and frequent tests of the water must be made.

Type II: Deposit Attack.—The principal cause of pitting which is the most frequent source of trouble in condensers is ascribed to what is termed "deposit attack." In the presence of sodium chloride solutions the cuprous oxide formed on a brass surface gradually changes to cuprous chloride. The latter is usually swept out of a condenser tube by the circulating water, but under various conditions may adhere at different parts of the tube surface. When such adherence has occurred, conditions now allow of the further gradual change of the insoluble cuprous chloride under the influence of oxygen to soluble cupric chloride and cuprous oxide. A piece of brass tube 2 in. long, placed in a strong cupric chloride solution at ordinary temperature, was completely disintegrated and partly replaced by a pseudomorph in copper in two days. Attention is drawn to the importance of keeping tubes clean and as free as possible from foreign bodies as a means of preventing deposit attack.

Type III: Layer Dezincification.—The conclusion is reached that true parting of zinc and copper in a 70:30 brass does not occur but that the so-called residual copper is always redeposited copper. The layer type of dezincification, which is characterized by disintegration of the brass tube and redeposition of copper over large areas, has been found to occur under both marine and fresh water conditions. Under fresh water conditions it is often associated with acid water, particularly if the acid is not too dilute and the access of oxygen is not very easy.

Type IV: Plug or Local Dezincification.—This type of local corrosion may be regarded as a form of deposit attack as it always proceeds beneath a deposit, and is stimulated by the presence of foreign bodies. It differs, however, in many ways from Type II. It is shown that the production of the right concentration of zinc in the liquid layer adjacent to the corroding brass surface plays a large part in the formation of the characteristic white oxysalt, and that interference with the production of this condition, *e.g.* by lowering the zinc content of the brass or by raising the zinc content of the sea-water, is sufficient to prevent its occurrence. The dezincifying action is thought to be due to a small concentration of hydrochloric acid contained within the colloidal white salt.

Type V: Water-Line Attack.—In the case of a brass tube only partly immersed in sea water, increased corrosion (compared with that of the immersed portion) takes place, not at the water line as is commonly supposed, but above it, and sometimes as much as 2 cm. above the air-sea-water surface. Further, the attack is not uniform but is concentrated at areas where salt deposits have formed and is coterminous with the area covered by the deposits.

The fourth section contains an account of preliminary work on the electrolytic protection of condenser tubes. The particular question investigated was that of the efficiency of electrolytic protection in preventing deposit attack, *i.e.* attack by cupric chloride solution. Suggestions are made whereby the usefulness of the electrolytic protection process may be extended by special manipulation of it in the early part of the life of a tube, with the object of forming a thin continuous layer of calcium carbonate over the surface of the tube.

DISCUSSION

Prof. H. C. H. Carpenter, opening the discussion, pointed out that the problem was not only one of corrosion but of finding an alloy which could be produced commercially and had the necessary properties in manufacture and use. The various mechanical possibilities of the alloys had also to be considered as well as their liability to corrosion. An important fact brought out was that the altered surface layer of the tubes due to drawing was much more resistant than the crystalline metal underneath. This was a matter of great practical importance if the manufacture of the tubes could be so conducted as to make the surface layer continuous.

Dr. Walter Rosenhain was most interested in the reference to the surface layer, and said it was a new and extremely interesting fact that this layer could be separated. He thought, however, that the explanation of the authors was not fully justified, *i.e.*, that the three different materials (flowed material, crystalline material and inter-crystalline material) underwent solution at different rates. All one could really say was that the corrosion took place more rapidly at the junction of the flowed material. He thought the whole question of combating corrosion in marine condenser tubes was a question of avoiding deposit. He suggested the use of vertical instead of horizontal tubes as a means to this end.

Dr. O. F. Hudson said that the results of the fresh experimental work were extremely valuable, especially in regard to the explanation of how severe corrosion took place beneath the deposits. That explanation met all facts of the case. The new light thrown by the authors on dezincification was equally satisfactory.

F. de Wurstemberger of Switzerland said he had made a special study of the corrosion of condenser tubes since March, 1915, and he had soon found the dezincification theory as previously put forward to be erroneous. He was glad this was confirmed in the present report. His own view was that electrolytic action was far more important than any chemical action as a cause of corrosion, and in this respect his own results differed from those in the report. He had found only the previous week considerable currents in a condenser plant installed in France, of which he had taken voltmeter measurements.

R. T. Rolfe referred to the question of water supply to the condensers and the remissness of engineers in obtaining preliminary data of the nature of the water to be used. At the same time it was often difficult to say for certain if a given sample of water would corrode the tubes or not. The authors of the report threw no light on this subject, and further information would be extremely valuable.

The president thought that the work could only be regarded as complete when they could safely look upon the condenser tubes as being likely to give no trouble at all. He would like to know if the surface layer was the same in a tube drawn direct from a cast shell as in one which had first been turned and bored. In regard to Dr. Rosenhain's suggestion, he personally would like to have the tubes in a vertical position, but he was afraid considerations of space would prevent this idea being carried out in the navy. He would, however, go carefully into the matter.

The Art of Casting in High Tensile Brass

The results of the work submitted by Mr. Neil J. Maclean of Glasgow, under the above title, are briefly as follows:

1. Castings in "manganese-bronze" as submitted by firms specializing in that alloy were found to be unsatisfactory, in that they were unreliable in strength properties and failed to fulfil the makers' claims.

2. It was decided to experiment with a view to producing an alloy which, when cast in sand molds without chilling, could be depended on to give results 50 per cent better than Admiralty gun metal.

3. Experiments were made first with a single brass containing manganese; to this in turn were added vanadium, titanium, cadmium, and later nickel and iron. The results were at first erratic, but gradually became more reliable.

4. The alloy finally chosen, after trying a large number, consisted of:

	Per Cent
Copper	60.0
Zinc	34.0
Nickel	3.0
Iron	2.0
Lead	0.25
Manganese	0.5
Phosphor-tin	0.25

5. A special hardener was made consisting of:

	Per Cent
Copper	75.0
Nickel	15.0
Iron	10.0

This was melted in a crucible and granulated by blowing a stream of the molten alloy into a tank containing water.

6. Special precautions were taken to keep the zinc content of the alloy constant by careful weighing of the charge, temperature control of the charge while in the furnace, and instructions to furnacemen on their duties.

7. Special precautions were also observed in keeping the pouring temperature of the alloy constant by temperature control after removing the crucible from the furnace.

8. Scrap metal consisting of foundry scrap, leads, gates, etc., and machine shop scrap was carefully collected and melted down into ingots. Each ingot was analyzed and the quantity of zinc required to correct for zinc content noted.

9. The charge was finally made up, using some scrap, some new metal, a quantity of hardener, and zinc to correct the zinc content.

10. This alloy, when properly melted and poured, can be relied upon to give sound castings, cast in sand molds, having a breaking strength of 20 tons per sq. in., elastic strength 10 tons per sq. in., and elongation 15 per cent on a length of 2 in.

DISCUSSION

H. B. Weeks referred to his experience with high tensile brasses several years ago, which though found suitable, and actually adopted for admiralty purposes, were later abandoned on account of an objection to the pale color of the alloy.

R. T. Rolfe considered gun metal able to hold its own against so-called high tensile brasses. An important objection to these high tensile brasses was the difficulty encountered in securing sound castings, shrinkage being chiefly prevalent.

H. O. Ellis said that his experience with both gun metal and high tensile brass left him with the conviction that there was as yet very little advantage in the use of the latter.

The president asked if it would not be advisable to abandon the use of gun metal in favor of high tensile brass, which was cheaper.

Mr. Maclean, in replying, thought that a great deal could be done toward establishing high tensile brass by airing the subject more thoroughly than had yet been done. He advocated broader training for foun-

drymen and courses of lectures for apprentices and others connected with the brass foundry.

The Removal of Internal Stress in 70:30 Brass by Low Temperature Annealing

The authors of a communication from the Research Department, Woolwich, bearing the above title are H. Moore and S. Beckinsale. It is now generally recognized that considerable internal stresses frequently exist in brass articles which are subjected to cold-work operations during manufacture, and that these stresses may bring about failure by cracking, either through lapse of time or under the action of certain substances, among which mercury (in the form of solutions of its salts) and ammonia are peculiarly active. For some time the authors have employed the term "stress cracking" to indicate this type of failure, and "accelerating agents" to indicate those substances which hasten the development of cracks in brass in a state of stress.

In the course of an investigation into the failure by stress cracking of certain components of war stores made from 70:30 brass by a process of cold working, it was found that internal stress could be entirely removed without important reduction of hardness, by annealing within certain limits of temperature. This led to the more careful determination of the minimum temperature at which internal stress can be completely removed and the effect of annealing, within the temperature range studied, on Brinell hardness. Both as regards the removal of stress and the effect on hardness, length of time of annealing is a factor of great importance.

The author's experiments were carried out on spun cups of brass and strips of known hardness annealed for different periods. The cups were submitted to the mercurous nitrate test, while Brinell hardness tests were made on the strips. The results obtained show:

(1.) The harder the brass, the lower the temperature and the shorter the time of annealing, which will cause a reduction of hardness.

(2.) 70:30 brass cold-worked to about the maximum possible hardness (about 200) begins to show some reduction of hardness at temperatures and times which are insufficient to remove internal stress completely. This degree of hardness is, however, rarely obtained in brass articles, and is probably never necessary. Even in brass of this hardness internal stress may be completely removed by treatment involving only a very moderate reduction of hardness.

(3.) For 70:30 brass cold-worked to a Brinell hardness not exceeding 165 there is a useful range of temperature, in which internal stress may be completely removed without appreciable loss of hardness. Annealing for one hour at 275 deg. C., or for rather shorter times at slightly higher temperatures, is a treatment which is generally suitable. In cases in which there is no serious objection to protracted annealing slightly lower temperatures may be used, and these involve less risk of undesirable softening. Five hours at 250 deg. C. might be suitable in such cases. It is rarely, if ever, that a Brinell hardness exceeding 165 is required in 70:30 brass, and lower figures are sufficiently high for most purposes.

The behavior, under a variety of tests, of spun cups such as have been used in this work, indicates that when no heat treatment has been applied after spinning the internal stresses are very high. It is probably a safe assumption that they are at least as high as the stresses present in any article made by cold-working 70:30 brass. The authors conclude, from their experience with spun cups and with numerous manufactured articles of various forms, that a treatment which will remove the stresses existing in the spun cups described is sufficient to remove the internal stresses from any manufactured article.

Discussion

Dr. Rosenhain thought the term "stress-cracking" was unsuitable, seeing that all cracks are caused by stress. He thought "time-cracking" more appropriate. He also pointed out that it was not yet proved that no internal stress existed when mercurous nitrate failed to develop cracks, as the authors apparently assumed.

Dr. W. H. Hatfield showed a number of slides giving the results of recent experiments of his own. These especially demonstrated that the harder the brass was drawn, the lower the temperature at which annealing took effect. He also gave data showing the effect of the speed of applying the load on the results of the tensile tests for steel, brass, and duralumin respectively. In brass the maximum stress slightly increased with slowly applied loads, and the same was the case in duralumin, but there was no special effect in steel.

The president said he gathered from the paper that it was possible to take out the internal stress without affecting the hardness. If this were so it would be most valuable for condenser tubes.

Mr. Moore, in closing, agreed with Dr. Rosenhain in the matter of phraseology, but said he would prefer to use the term "internal stress cracking." In reply to the president, he thought it was quite possible to remove internal stress for all practical purposes from condenser tubes on the lines given in the paper.

The Effects of Cold Work

Two papers which were discussed jointly were entitled "The Effect of Progressive Cold Drawing upon Some Physical Properties of Commercially Pure Copper," by W. E. Alkins, M.Sc., and "The Influence of Cold Rolling on the Physical Properties of Copper," by F. Johnson. The former is an extension of some most important investigations already published, which showed the change in tensile strength with progressive reduction in area. Mr. Johnson's paper, admittedly "inspired" by a previous paper of Mr. Alkins, is an attempt to demonstrate the same phenomena, only more so, in cold rolling. Some criticism was directed at the way Mr. Johnson has drawn his curves, in which a number of "steps" appear, where other investigators would certainly have plotted a smooth curve.

The following papers were also presented to the meeting and in most cases briefly discussed:

"The Action of Aluminum on Hard Industrial Waters," by Richard Seligman and Percy Williams.

"Zinc Alloys with Aluminum and Copper," by W. Rosenhain, J. L. Haughton and Kathleen Bingham.

"A Model for Representing the Constitution of Ternary Alloys," by W. Rosenhain.

"Tin-Phosphorus Alloys," by A. C. Vivian.

"Some Notes on the Effect of Hydrogen on Copper," by W. C. Hothersall and E. L. Rhead.

"The Study of Thermal Electromotive Force as an Aid to the Investigation of the Constitution of Alloy Systems," by J. L. Haughton.

"Note on the Polishing and Etching of Zinc for Microexamination," by H. H. Hayes.

"Idiomorphic Crystals of Electro-Deposited Copper," by W. E. Hughes.

Steel Treaters' Nineteenth Chapter

The Springfield Chapter of the American Steel Treaters' Society was launched at Springfield, Mass., on Monday evening, March 22. This makes the nineteenth chapter of the parent organization. It has a large list of charter members. The chairman of the new chapter is Major A. E. Bellis, metallurgist United States Army; vice-chairman, R. J. Allen, engineering department, Rolls-Royce and secretary-treasurer, C. D. Hawkins, metallurgist Moore Drop Forging Co. The executive committee consists of George W. Batty, superintendent forge shop, Harley Co.; George W. Clark, master mechanic, Westfield Mfg. Co.; R. W. Ellingham, works manager, Van Norman Machine Tool Co; F. E. Stricker, metallurgist Stevens-Duryea; H. L. Washburn, works manager, Napier Saw Co., and E. L. Woods, industrial gas engineer, Springfield Gas Light Co.

Busy Shipyards

WASHINGTON, March 30.—American shipyards are still getting busier from month to month. According to the figures of the Bureau of Navigation, 247 steel merchant ships, totaling 947,193 gross tons, were in course of construction March 1, 1920; on Feb. 1 the figure had been 183 steel vessels of 791,911 gross tons, and on Jan. 1, 165 ships totaling 679,170 gross tons.

The largest list of contracts is that of the Sun Shipbuilding Co., Chester, Pa., which is building 30 ships with a tonnage of 149,790. The Federal Shipbuilding Co., Newark, N. J., is second with 17 ships with 119,500 gross tons.

PERSONAL

Charles S. Amadon has resigned as general manager of the J. N. Lapointe Co., New London, Conn., to become president of the Euclid Broach and Machine Co., Cleveland. Louis E. Peck has resigned from the J. N. Lapointe Co. to become treasurer of the Euclid Broach & Machine Co.

Trusten P. Draper, general manager Sharon Steel Hoop Co., Sharon, Pa., has been elected vice-president and a director. He was formerly superintendent of the Trumbull Steel Co., Warren, Ohio.

Thomas C. Williams, for the past ten years assistant superintendent of the Empire sheet mills of the Brier Hill Steel Co., Youngstown Ohio, has been appointed superintenent, succeeding Harry C. Davis, resigned. Harry Holloway has been named superintendent of the Thomas works. Both the Empire and Thomas plants are located at Niles, Ohio.

Ralph E. Sharp, formerly Boston representative of the Donner Steel Co., Inc., Buffalo, is now associated with the Boston office of the Midvale Steel Co.

A. L. Cromlish, superintendent of the blast furnace department of the Sharon and Farrell works of the Carnegie Steel Co., has been appointed general superintendent, succeeding O. J. H. Hartsuff, who became general superintendent of the Edgar Thomson blast furnaces and steel works at Braddock, Pa. on April 1. Harry Becht, who has been assistant superintendent of blast furnaces, succeeds Mr. Cromlish as superintendent.

W. R. Cunnick has been appointed special representative of the Falcon Steel Co., Niles, Ohio, in charge of its eastern territory.

Edward Klepfer has become manager of the refined oil department of the Warren Oil Co. of Pennsylvania, Warren, Pa. In the war he was lieutenant in a battalion of snipers and scouts of the 319th Infantry. Previous to the war he was a member of the Cleveland American League Baseball Club.

To succeed Hardy Greenwood, deceased, H. H. Richardson has been appointed district sales agent at Dallas, Tex., by the Youngstown Sheet & Tube Co., Youngstown, Ohio. Mr. Richardson traveled out of the St. Louis office of the company.

Col. F. M. Gunby has been appointed engineering manager of Charles T. Main, Boston, industrial engineer. During the war he was head of the engineering branch of the construction division of the army. Before the war he was associated with the Charles T. Main organization for 15 years.

John H. McElhinney, assistant chief engineer Youngstown Sheet & Tube Co., Youngstown, Ohio, has been awarded the French Legion of Honor in recognition of his services in the ordnance department overseas. He served eight months in France.

Charles F. Overly has recently been appointed general manager of sales of the Structural Tool Co., Cleveland. For years Mr. Overly was connected with the manufacture of pneumatic tools, after which he formed the Overly Industrial Tool Co., becoming president. Upon the formation of the Structural Tool Co. Mr. Overly combined with the new corporation. The company is located in its large new plant on West 106th Street, Cleveland. It manufactures rivet sets, chisel blanks, punches, dies and pneumatic tool parts.

Fred Magoris chief timekeeper at the Farrell works of the Carnegie Steel Co., has been named superintendent of the home building department of the Carnegie Land Co., subsidiary in charge of the company's housing projects for employees. He will direct purchase of materials and construction of dwellings for the company. Mr. Magoris has been with the company 15 years.

The Metal & Thermit Corporation, New York, has appointed James G. McCarty manager of its Canadian branch, with headquarters in Toronto, and has transferred Robert L. Browne from its New York office to Boston, where he will have charge of all sales in the New England States. Mr. McCarty was graduated from Stevens Institute of Technology in 1906 and became affiliated with the Metal & Thermit Corporation in 1909. Mr. Browne has been associated with the New York office of the company since 1917.

M. Kessler is superintendent at the Athol Machine Co. plant, Athol, Mass. For many years Mr. Kessler was with the Westinghouse Electric & Mfg. Co. at Pittsburgh and afterward at the company's East Springfield plant.

G. L. Bohannon, formerly chief engineer and assistant general manager Youngstown Steel Car Co., Youngstown, Ohio, is now with the Thomas Spacing Machine Co., Pittsburgh, as manager of its eastern office in Philadelphia at 57 Transportation Building.

At the annual meeting of Midwest Forge & Steel Co., East St. Louis, Ill., the following new officers were elected: J. W. Eschenbrenner, president and treasurer; C. T. Coates, vice-president and general manager; E. A. Eschenbrenner, secretary. The business was established in 1885, and for the past five years has been specializing in cement mill and mine forgings, particularly grinding plates and steel balls.

The Kelley Metals Co., Chicago, Detroit and Los Angeles, announces additions to its sales staff as follows: C. G. Germaine, who has represented the Standard Welding plant of the Standard Parts Co. in the western territory, has resigned to accept the position of western representative of the Kelley Metals Co., with headquarters at Chicago. S. C. Bohannon of Indianapolis, one of the sales representatives of Indiana, has been appointed State of Indiana representative for Kelley Metals Co. with headquarters at Indianapolis. M. E. Simpson, formerly general manager of the Minneapolis Steel & Machinery Co., also the Toro Motors Co., has been appointed representative for the Kelley Metals Co. in the Northwest territory with headquarters at Minneapolis.

Prof. Elihu Thomson, Swampscott, Mass., chief consulting engineer, General Electric Co., Lynn, has been appointed acting head of the Massachusetts Institute of Technology until a successor is chosen for the place made vacant by the death of Richard Maclaurin.

C. L. Sonen, recently resigned as production engineer of the Teetor-Hartley Motor Corporation, Hagerstown, Ind., and the Ansted Engineering Co. Connersville, Ind., to form the C. L. Sonen Co., industrial manufacturing engineer, metal processing plants, Indianapolis. He has been an executive and engineer for 24 years.

The Barber-Greene Co., manufacturer of belt conveyors and self-feeding bucket loaders, Aurora, Ill., is now represented in St. Louis by R. E. Foulke, 404 Third National Bank Building; Pittsburgh, by J. A. Gurney, 605-606 Arrott Building; Philadelphia, by F. S. Sawyer, 1010 Penn Square Building, and Indianapolis, by W. T. MacDonald, 305 Merchants Bank Building.

Allen A. Ryan has resigned as a director of the Bethlehem Steel Corporation.

At the annual stockholders' meeting of the Whitman & Barnes Mfg. Co., Akron, Ohio, twist drills, reamers, wrenches, forgings, A. D. Armitage was elected president; W. H. Eager and A. B. Hall, Akron, Ohio, and W. J. Elliott, St. Catharines, Ont., Can., vice-presidents; E. A. Fisher, treasurer; W. E. Rowell, secretary, and S. H. Tuttle, assistant secretary, all of Akron, Ohio. Mr. Elliott is an additional vice-president and has heretofore been manager of the St. Catharines' factory. He will now have entire charge of the Canadian division of the company's business, selling and manufacturing. Twenty-seven years ago he entered the employment of Whitman & Barnes in a minor position. In January, 1908, he was made manager.

Frederick J. Wuest, aged 73, has resigned as general superintendent of the George H. Bishop Saw & Edge Tool Mfg. Co., Lawrenceburg, Ind., after being an employee of the company for more than 50 years. He is the inventor of many of the saws and tools made by the company and of some of the machinery used.

Failing health is the cause of his retirement. W. H. Tuthill, Columbus, is the new superintendent.

L. P. Ross, of Plattsburgh, N. Y., who has been for several months consulting engineer of the Wharton Steel Co., supervising the remodeling of its works at Dover, N. J., has been elected a director of that company. Arrangements have been made with him by the Wharton Steel Co. to continue an oversight of its blast furnaces during completion of the remodeling and also while in active operation.

Herbert C. Hoover, president of the American Institute of Mining and Metallurgical Engineers, will address the monthly meeting of the New York section at the Machinery Club, 50 Church Street, Wednesday evening, April 7, on "The Mining Engineer's Place in Industry—Is He Filling It Fully?"

W. T. Brangham has been appointed assistant general manager of sales the Falcon Steel Co., Niles, Ohio.

E. H. Haslam, vice-president of Mackintosh-Hemphill Co., Pittsburgh, builder of engines and general rolling mill equipment, has resigned and will be connected with the Steel & Tube Co. of America, Chicago, in an official capacity. Mr. Haslam has been connected with the Mackintosh-Hemphill Co. in various capacities for about 15 years, and prior to that time was with the Pressed Steel Car Co., Pittsburgh.

L. M. Smith and C. J. Craven, both formerly with the Standart Motor Truck Co., Detroit, have joined the Detroit Transportation Truck Co., the first as production manager, the second as manager of the manufacturing stock department.

C. A. White has resigned as order department manager of the American Tube and Stamping Co., Bridgeport, Conn., to return to his former position as purchasing agent for the Hero Mfg. Co., Philadelphia.

At a recent meeting of the Newark Stamping & Foundry Co., Newark, Ohio, R. A. Guilick was elected president and general manager, C. F. Sietes, vice-president and manager and F. W. Moser, secretary. Mr. Guilick was formerly with the May-Fieberger Furnace Co., Akron, which was purchased some time ago by the Newark company.

H. P. Meredith, formerly maintenance engineer for E. I. duPont de Nemours & Co., and previously assistant to Vice-President Atterbury of the Pennsylvania Railroad, has been appointed manufacturing manager of the Saxon Motor Car Co., Detroit.

Charles C. Phelps recently became associated with the Uehling Instrument Co., 71 Broadway, New York, combustion engineer, as well as manufacturer of carbon dioxide recording equipment and other fuel economy apparatus. He is devoting most of his attention to research work in connection with the efficient combustion of fuel oil in boiler furnaces.

Samuel D. Sleeth has completed 50 years of continuous service with the Westinghouse Air Brake Co., Wilmerding, Pa., for many years having been superintendent of foundries of that concern, which position he still holds. In commemoration of his long connection with the company, he was presented by the employees and officials an arm chair and other tokens.

James P. Roe has resigned as general superintendent of the Glasgow Iron Co. to accept a position with the Reading Iron Co., where his major efforts will be given to the development of the Roe puddling process. George Johnston will continue as superintendent of the Roe puddling department.

Saxon Motor Car Corporation, Detroit, announces that Harry L. Bill, formerly with the Winton Motor Car Co. of Cleveland, has become its vice-president and general manager.

Employees of the American Brass Co., Ansonia, Conn., are on strike for an increase in pay of 33½ per cent for all making 60c. or less per hour, and an increase of 25 per cent for all earning more than 60c. The company has offered no concessions, inasmuch as the wages paid are as high or higher than elsewhere.

OBITUARY

JOHN JEPPSON, one of the founders of the Norton Co., Worcester, Mass., and for many years a director and superintendent of the plant, died suddenly in Havana, Cuba, March 26. With him were his wife and his son, George N. Jeppson, works manager of the Norton Co. He was 75 years old. John Jeppson was born in Hoganas, Sweden, July 1, 1844. He served his apprenticeship in the trade of architectural worker in clay, and when 25 years old came to America, where he was employed in potteries in various cities. He established himself in Worcester in 1880, entering the employ of F. B. Norton, who conducted a pottery and who had been experimenting with the making of emery wheels artificially and the machines with which to use them in grinding metal. Mr. Jeppson played an important part in the subsequent development of these investigations. In 1884 the Norton business was bought by a group of men, consisting of Mr. Jeppson, Prof. George I. Alden and Milton P. Higgins, then heads of department of the Worcester Polytechnic Institute, Charles L. Allen, now president of the Norton Co., Fred H. Daniels and Horace A. Young, and from this enterprise the present Norton business has developed. Mr. Jeppson was the superintendent from the very beginning, and continued in active charge of the works until a few years ago, when he was succeeded by his son as the active head, though he himself continued to be an important factor of the management in an advisory capacity.

JOHN N. DERBY, inventor and vice-president and director of the firm of Manning, Maxwell & Moore, with offices at 119 West Fortieth Street, New York, died of heart disease at Greenwich, Conn., March 28. He was born in Saginaw, Mich., in 1866, and was a graduate of the University of Michigan. He started in business in that State, developing steam specialties. In 1888 he organized the Hayden & Derby Mfg. Co. About 30 years ago he became identified with Manning, Maxwell & Moore, Inc., and that firm took over the handling of the Metropolitan injector made by the other company. Later on the Hayden & Derby Mfg. Co. was absorbed by the United Injector Co., of Boston. Mr. Derby had full charge of the general sales of steam specialties built by the Ashcroft Mfg. Co., Consolidated Safety Valve Co., Bridgeport, and the Hancock Inspirator Co., Boston. At the time Manning, Maxwell & Moore were incorporated Mr. Derby was made a director, first vice-president and member of the executive committee, and has held these positions ever since. Mr. Derby paid special attention to the sale of steam fittings, etc., for the railroad trade. He was a member of the Engineers' Club and the Railroad Club, New York. He leaves a wife, one son and two daughters.

WALTER M. MORROW, for 25 years a pig iron salesman for M. A. Hanna & Co., Cleveland, died in St. Petersburg, Fla., March 27, aged 47 years. He went to Florida in December on account of poor health. He was one of the best-known pig iron salesmen of the central West and a man of high character, which won him a host of friends. His home was in Erie, Pa.

DAVID NEWLIN BALDERSTON, for many years a resident of Elizabeth, N. J., died March 22 at Philadelphia. For about 22 years he was with the Electro Dynamic Co., Bayonne, N. J., as engineer and superintendent of the axle light department. The electric car lighting equipments of many railroads include generating apparatus designed by Mr. Balderston.

ZEAR J. CHAMBERLAIN, aged 45, died suddenly March 20 in St. Louis, Mo. Mr. Chamberlain was connected with the Ludlow-Saylor Wire Co., having been with this concern since he was 17 years old.

J. C. SCOTT, manager of the tool steel department of the Bourne-Fuller Co., Cleveland, died Sunday, March 21, after an illness of about a month. Mr. Scott had been with the company 35 years.

Short Trade Items

The Oxweld Acetylene Co., Newark, N. J., and Chicago, has recently extended its manufacture of oxy-acetylene apparatus and equipment to include "Eveready" welding and cutting outfits, formerly known as "Prest-O-Lite."

More Government certificates of appreciation for their efforts in manufacturing and furnishing supplies of various kinds during the world war have been given New England manufacturers. Some of those firms to receive certificates during the past week are: Chandler & Farquhar Co., Boston, machinists' tools and general hardware; Exeter Brass Works, Exeter, N. H.; Osgood-Bradley Car Co., Worcester, Mass., and the Wheeler Reflector Co., Boston.

Charles Napier, formerly of the Napier Saw Works, Springfield, Mass., as president and assistant treasurer, and Milton Alden, 54 Washington Road, Springfield, as treasurer, recently incorporated under Massachusetts laws the Alden-Napier Co., with a capitalization of $50,000, consisting of 250 shares of common stock, par $100, and 250 shares of preferred, par $100, all of which has been paid in. The charter provides for the purchase or building of a plant in which to conduct a general molding business, foundry and machine shop. The new company is interested in beckelite, to be used in insulators and in other ways, which is now being produced by the Dental Electric Co., 43 Dwight Street, Springfield, electrical specialties, which it is understood, will be taken over by the Alden-Napier Co. at some future date.

The Honolulu Iron Works Co, with an office at 233 Broadway, New York, has just purchased a half interest in the Earnshaws Slipways & Engineering Co. at 3,500,000 pesos, the two companies to be later fused into a single corporation to be capitalized at 10,000,000 pesos, to go into marine engineering and the manufacture of sugar-making machinery more extensively than either as a separate company has done in the past. Large plants for the manufacture of machinery will be established in Manila and Iloilo.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has acquired a financial interest in the George Cutter Co., South Bend, Ind. The management and commercial policies of the latter concern will remain unchanged, but advantage will be taken of the Westinghouse engineering and other facilities to expand the activities of the George Cutter Co. and further develop its line of products. The Westinghouse company, in the future, will be sole distributor of the products of the George Cutter Co.

The Bronzbrazwyt Metals Co., Pittsburgh, has been reorganized and has changed its firm name to Pittsburgh Bronze Casting Co., with a capital of $50,000, and its plant will remain in its present location on Butler Street, Pittsburgh. Carl P. Seyler, vice-president and general manager of Hubbard & Co., is president of the reorganized company, John T. Seyler, vice-president, and Carl J. Seyler, secretary and treasurer.

The Fowler Nail Co., Seymour, Conn., established in 1865 and the Union Horse Nail Co., Chicago, Ill., established in 1874, for some time operated separately under the same control, have been merged under the name of the Fowler & Union Horse Nail Co., and will move to Buffalo, upon completion of their new plant at 1000 Military Road.

The Standard Steel & Bearings Co., Plainville, Conn., roller bearings, formerly the Rockwell-Drake Co., is operating its plant on three eight-hour shifts. The working force will soon be increased from 700 to 1200 men, by drawing from the company's plants at New Haven, Conn., and in Pennsylvania cities.

The Southwark Foundry & Machine Co., Philadelphia, will soon start the production of light machinery in the plant of the Quincy Engine Co., Chambersburg, Pa., which was leased last fall. The plant will employ between 150 and 200 men. New machinery will be shipped to Chambersburg within the next several weeks by the Philadelphia company.

John W. Thorne & Co., Inc., 165 Broadway, New York, exporter and importer, is now conducting business under the name of Murphy-Ray, Inc. The present board of directors of John W. Thorne & Co., Inc., will continue in office as directors of Murphy-Ray, Inc.

The Akron-Newton Furnace & Machine Co., E. D. Reed of Akron, president, has acquired the plant and business of the Frank B. Hall Mfg. Co. at Newton Falls, Trumbull County, Ohio. A new foundry will be erected. The company is capitalized at $200,000.

The Pere Marquette announces that approximately $10,000,000 of trust equipment notes will be issued to finance the purchase of additional rolling stock. The purchases contemplated include 2000 box cars, 1000 hopper cars, 30 light locomotives and 10 switch engines.

The Accurate Screw Machine Co., 128 Mulberry Street, Newark, N. J., has purchased the business of the George H. Greenhalgh Co., Cross and Fifth Streets, Harrison, N. J., and will operate there in the future.

The Empire Coke Co., Geneva, N. Y., operating a gas and coke plant at Border City for service to Auburn, Geneva, Waterloo, Seneca Falls and vicinity, is planning for extensions to the works, with considerable new equipment, to cost about $265,000. The installation will include a coke handling plant to cost about $33,000, new boiler plant and power house to cost $55,600, and new gas compressor to cost about $4,000.

A weather-proof electric siren designed as a starting and quitting signal or fire alarm for factories or other industrial plants is manufactured by the Federal Electric Co., 640 West Lake Street, Chicago. Sirens of smaller dimensions are manufactured for use as call signals within plants.

The approval of Trico renewable fuses in all capacities up to 60 ampere and 250 volts by the Factory Mutuals Fire Insurance Co., is announced by the M. B. Austin Co., 700 Jackson Boulevard, Chicago.

The Mesabi Iron Co., recently organized to beneficiate lean magnetites of northern Minnesota, Duluth, Minn., has ordered a 2000-kw. turbo generator for its power plant from the General Electric Co., Schenectady, N. Y.

The Greenfield Tap & Die Corporation, Greenfield, Mass., is issuing a new national or exterior house organ entitled "The GTD Helix." This firm has been publishing an employee's edition for two years and has felt the need of a publication of larger scope. Hence the new paper.

E. Edelmann & Co., manufacturers of automobile parts, Chicago, have completed the erection of their new plant in that city. It was started Oct. 15, 1919 and its completion in six months was accomplished in spite of the extreme winter weather which prevailed during a large part of the time. The new structure, which is 217 feet on Crawford Avenue by 725 on Schubert Street, is considered as a first unit and it is expected extensions will be made later. It is a one-story mill-type sprinkled building with saw-tooth roof and skylights. All provisions for the welfare and comfort of employees have been made. Among the new products which it expects to turn out is a spot light and a larger line of novelty hammers. The business was organized 10 years ago. The company announces the opening of a Canadian branch at Walkerville, Ont., which will be ready for business May 1. The New York office of the company is at 1733 Broadway.

The Hex, a new four-page newspaper monthly house organ, is being published by the Black & Decker Mfg. Co., Towson Heights, Baltimore.

Machinery Markets and News of the Works

BUSINESS IMPROVING

Latter Part of March Shows More Orders

Apprehension Over the Financial Situation Apparently Is Passing—Export Trade Shows Some Betterment

Reports from various trade centers indicate that machine-tool business in March will in the aggregate be much better than had been expected, the last two weeks showing a great improvement over the early part of the month. With some sellers March will be almost, if not fully, up to January and February, although this is not generally true. There has been a good volume of scattered buying. It is indicated also that apprehension over the financial situation is passing and transportation troubles are being slowly ironed out, though the railroad situation is still far from normal.

Chicago dealers note quite a marked revival in orders and inquiries. One dealer there expects March to be his best month so far this year. Cincinnati machine-tool builders make similar reports, there having been good buying in the last two weeks. Orders have been received there from the General Motors Corporation for several of its plants; also from the Cadillac Motor Co. for its new plant in Detroit and from the Ford Motor Co.

The Cleveland trade expects that a very good export business with the Far East will develop out of current inquiries. Some orders have been received from Japan and India, with possibly more to follow. The Cleveland Tractor Co., Cleveland, has bought a small list of tools.

Business is rather quiet in New England, though the volume of buying shows an improvement over the two preceding weeks. The second-hand tool market is active in that section.

The General Electric Co. requirements for its newly acquired Bridgeport, Conn., plant promise to be fairly large and are a conspicuous feature of the New York market. There has been other scattered buying, notably for export, two 60 in. lathes for Japan being one of the important orders placed.

There is some talk of further advances in prices of machine tools. A Central Western manufacturer of turret lathes and screw machines has announced raises of from 3 to 5 per cent, effective April 1.

New York

NEW YORK, March 30.

Requirements of the General Electric Co. for its newly acquired plant at Bridgeport, Conn., are a conspicuous factor in the machine-tool market. Inquiries supplementing the one for 50 or more tools published in the March 25 issue of THE IRON AGE have been sent out, there having been several of these inquiries, each calling for a few machines. The Edison Lamp Works of the General Electric Co. has also been buying for its machine shop at Waverly, N. J.

There is a very fair volume of miscellaneous business and sales records for March will in some instances compare very favorably with those of January and February, though there has not been the big buying in this month that characterized the first two months of the year. Scattered orders, however, have figured up a very large total. Some observers note a better feeling among manufacturers, there being less apprehension over the financial situation than was prevalent a month ago. With the passing of winter weather there has been a slight amelioration of transportation troubles, but conditions in that regard are still far from normal.

The Nathan Mfg. Co., New York, has bought a list of tools for its shop on 106th Street; the Federal Shipbuilding Co. continues to buy for its shipyard at Kearny, N. J.; the Farrel Foundry & Machine Co., Ansonia, Conn., has placed further orders for the equipping of its new plant at Buffalo, N. Y.; the Pennsylvania Pump & Compressor Co., which will build a new plant at Easton, Pa., has bought quite a number of used tools; the Champion Engineering Co., Kenton, Ohio, has bought about $100,000 worth of new and used tools here and at Pittsburgh for additions to its crane-building plant; the McIntosh & Seymore Corporation, Auburn, N. Y., which recently received a contract for Diesel engines totaling several hundred thousand dollars, has placed orders for some large tools, including a planer and a lathe, and the Spalding Chain Co., a subsidiary of the General Motors Corporation, has bought for its plant at Ann Arbor, Mich. It recently placed fairly large orders for tools for its Bloomfield, N. J., plant.

Railroad business is still in the developing stage. No orders have been placed by the Lehigh Valley Railroad on its recent list calling for quotations on 30 or more machines, but it is expected that this business will be placed soon. The Union Pacific Railroad is known to have a large appropriation for tools, but no list has been issued. It probably will be given to Chicago dealers. The Southern Pacific Railroad has inquired for about a half dozen tools at San Francisco.

Business in second-hand tools is active, the demand for large tools, particularly planers, being greater than the supply. Shipyards and paper mills are conspicuous as seekers for this class of equipment.

In the export field there is very little activity so far as European trade is concerned, but some orders are coming through from other parts of the world. An order for a large lathe for China is an example. Cuban sugar mills are also inquiring for tools. The American Sugar Refining Co., New York, is buying tools for a repair shop in Mexico. The Honolulu Iron Works, with office in the Woolworth Building, New York, has placed orders for a number of tools for shipment to the Philippine Islands, including two 60-in. lathes costing about $45,000.

A new project which may result in the purchase of considerable shop equipment is a dry dock and ship repair plant at Camden, N. J., which may be built by Fraser, Brace & Co., New York. The estimated cost is about $3,000,000. This company recently completed a similar plant on Staten Island.

The Bethlehem Motors Corporation, Allentown, Pa., is now producing on an average of about 500 complete motor trucks per month; it is planned to increase operations to a point of 600 trucks a month at an early date. It is reported that merger plans are under way with the Briscoe Motor Co., and that the manufacture of pleasure cars will be a feature of production at the local plant.

The United States Cast Iron Pipe & Foundry Co., Burlington, N. J., is planning for the installation of a number of machine tools, including lathes, drill presses, planers, etc.

Inquiry for cranes continues good, but chiefly for those of small capacity. The White-Gans Corporation, 111 Broadway, is building a ship repair plant in New Jersey. It includes two floating drydocks. The Standard Oil Co. is inquiring for a 10-ton, 41-ft. 3-in. span overhead traveling crane for Charleston, N. C. Bartlett, Hayward & Co., Baltimore, are in the market for one 5-ton and two 10-ton overhead traveling cranes.

Recent sales include: The Northern Engineering Co., two 2-ton, 13-ft. span and the Niles-Bement-Pond Co., three 3-ton, 18-ft. span, overhead traveling cranes to the General Electric Co. for Pittsfield, Mass.; the Shepard Electric Crane & Hoist Co., a 5-ton, 32-ft., 2½-cu. yd. capacity grab bucket crane to G. Ober & Sons, Baltimore, a 10-ton, 60-ft. span overhead traveling crane to Gilbert & Barker, Springfield, Mass., eight 2-motor electric hoists to the Hartford Rubber Works, Hartford, Conn., and a 3-ton, 32-ft. 8-in. span over-

head traveling crane to the Louis Sacks Iron Foundry, Newark, N. J.; the Ohio Locomotive Crane Co., a 15-ton, 50-ft. boom, 8-wheel locomotive crane to the Alpha-Portland Cement Co., Easton, Pa. The Titan Equipment Co. has sold a second-hand Orten & Steinbrenner road crane to Charles E. Burd, Red Bank, N. J. The Robert Dollar Co., New York, acting for a client in China, has purchased a 75-ton overhead traveling crane for export. The 30-ton overhead traveling crane purchased by the Queens Borough Gas & Electric Co., Far Rockaway, L. I., was placed with the Whiting Foundry Equipment Co.

Gould & Eberhardt, Chancellor Avenue, Irvington, N. J., manufacturers of shapers and other machine tools, have sold their former plant at Green Street and New Jersey Railroad Avenue. All operations will be concentrated at the Irvington works.

The Mono Service Co., Oraton Street and Verona Avenue, Newark, N. J., manufacturer of containers, etc., has awarded a contract to the Wark Co., 1737 Filbert Street, Philadelphia, for a two-story and basement addition, 103 x 175 ft., to form a complete new plant unit, estimated to cost about $250,000 with equipment.

The Humana Co., 56 Summer Avenue, Newark, N. J., manufacturer of automatic printing machinery, has acquired adjoining property, 121 x 125 ft., with three-story and basement building, about 100 x 100 ft., for extensions.

The City Commission, Jersey City, N. J., has completed plans for a new power plant at the City Hospital to cost about $50,000. Plans are now being prepared for a one-story machine and repair works, 100 x 100 ft., at Bright and New Brunswick streets, for upkeep of fire equipment.

The Carteret Foundry Co., Jersey City, N. J., has been incorporated with a capital stock of $150,000 by Percy G. Britt, attorney, 75 Montgomery Street, Jersey City, N. J., and A. M. Boyle.

The Standard Oil Co., Bayonne, N. J., will build a new boiler plant at its Constable Hook refining works to cost about $89,000, including equipment.

The Vacuum Oil Co., Constable Hook, Bayonne, N. J., has awarded a contract to John Monks & Sons, East Twenty-eighth Street, for a three-story can and case works addition, 65 x 160 ft., to cost $100,000.

The Arrow Motor & Machine Co., 397 Market Street, Newark, N. J., has acquired property, 173 x 259 ft., at 727 Frelinghuysen Avenue, for a new one and two-story plant, 73 x 102 ft., and 20 x 73 ft. respectively, estimated to cost $60,000.

Longdon & Longdon, Inc., Newark, N. J., has been incorporated with a capital stock of $100,000 by Alexander P. and H. F. Longdon and William K. Flanagan, attorney, 790 Broad Street, to manufacture iron and steel products.

The Rubberset Co., 56 Ferry Street, Newark, N. J., manufacturer of brushes, etc., has acquired a factory at Gravenhurst, Ontario, and will establish a works for the production of turned handles, etc. It is proposed to equip it at once and inaugurate production at an early date.

The Wright Aeronautical Corporation of America, 40 Wall Street, New York, has completed plans for its proposed two-story reinforced-concrete plant, 45 x 200 ft., on Meeker Avenue, Newark, N. J., to cost about $350,000. John W. Ingle, 527 Fifth Avenue, New York, is the architect.

The Aemile Bachelet Corporation, Kingston, N. Y., has been incorporated with a capital stock of $150,000 by E. Bachelet, R. E. Smith and C. R. Cummings, to manufacture power-plant equipment, generating apparatus, etc.

Putnam & Co., 32 Howard Street, New York, manufacturers of hand cranes, etc., have acquired a factory at 229-37 Union Avenue, near North Eighth Street.

The Peerless Tube Co., Locust Avenue, Bloomfield, N. J., manufacturer of collapsible tubing, has awarded a contract to the Salmond Brothers Co., 526 Elm Street, Arlington, N. J., for an addition to cost about $150,000, including equipment.

The Borough Council, Butler, N. J., has authorized W. O. Runyon of Runyon & Carey, 843 Broad Street, Newark, N. J., electrical and mechanical engineers, to prepare plans and specifications for an addition to the municipal electric power plant, estimated to cost $50,000.

The Artglo Mfg. Co., Montclair, N. J., has been incorporated with a capital of $125,000 by Chester G. Bollenbach, A. L. Friedmann and Michael S. Fiala to manufacture metal furniture.

The Manhattan Rubber Mfg. Co., Willett Street, Passaic, N. J., manufacturer of mechanical rubber goods, has acquired land at Whippany, on the Morristown & Erie Railroad, and plans a rubber reclaiming plant to cost about $500,000, including machinery.

The General Insulate Co., 1008 Atlantic Avenue, Brooklyn, manufacturer of telephone equipment, etc., has increased its capital stock from $50,000 to $250,000.

The United Metal Box Co., New York, is planning for a plant at 49 Sixth Avenue, occupying two floors.

The Embossing Co., 20 Pruyn Street, Albany, N. Y., manufacturer of mechanical toys, metal specialties, etc., is planning for a four-story plant addition at Broadway and Pruyn Street.

The Donning Carburetor Corporation, 233 Broadway, New York, has been incorporated in Delaware with a capital stock of $1,000,000. Robert Grant, iron and steel merchant, of the same address, is interested in the company.

Magid, Katzman & Strober, 56 Boerum Street, Brooklyn, manufacturers of metal specialties, have filed plans for a three-story brick plant, 75 x 165 ft., at 1196-1202 Flushing Avenue, to cost $85,000.

The American Die & Tool Works, Inc., 173 Lexington Avenue, Brooklyn, has leased property at 285-7 North Sixth Street for a new plant.

The City Commission, Herkimer, N. Y., is planning for an addition to the municipal electric power plant, one-story, 40 x 60 ft., to cost about $150,000, including equipment. Michael Foley is president of the commission. H. B. Sweet, Clarendon Building, Utica, is the architect and engineer.

The Garford Motor Truck Co., 427 West Forty-second Street, New York, is completing plans for a 12-story service and repair building to occupy an entire block front on the Bridge Plaza, Long Island City, N. Y. McAvoy, Smith & McAvoy, Bridge Plaza, Long Island City, are the architects.

The Interboro Hoist & Body Co., New York, has been incorporated with a capital stock of $50,000 by H. Geller, E. A. Travshaw and N. M. Fischer, 287 West Eighteenth Street, to manufacture hoisting equipment, truck bodies, etc.

The Joseph Baker Sons & Perkins Co., White Plains, N. Y., has been incorporated with a capital stock of $100,000 by W. Leitch, R. E. Baker and E. Wilde, 1 East Fifty-sixth Street, New York, to manufacture machinery and parts.

Gold & Schildcrout, Inc., New York, operating an iron works at 49 West 140th Street, has filed notice of dissolution.

The Emerson Phonograph Co., 3 West Thirty-fifth Street, New York, has leased a three-story reinforced-concrete factory, 115 x 200 ft., now being erected on Pierce Avenue, Eighth to Ninth streets, Long Island City, for a new talking machine plant.

The New York Edison Co., Irving Place and Fifteenth Street, New York, has completed plans for a three-story power plant, 42 x 75 ft., at 421-23 East Sixth Street, to cost about $300,000, including equipment. It will also build a new one and two-story station, 100 x 200 ft., on 179th Street, near Inwood Avenue. William Whitehill, 32 Union Square, New York, is the architect.

The Type Adder Mfg. Co., New York, has been incorporated with a capital stock of $100,000 by M. Samberg, J. C. and J. L. Heichman, 233 Broadway, to manufacture special machine equipment.

The Rapidpak Machine Co., New York, has been organized by J. J. Millin and E. D. Leshin, 627 West 136th Street, to manufacture packing machinery.

The Rainier Motor Corporation, 225 West Fifty-eighth Street, New York, with plant on Bayside Avenue, Flushing, is planning for a plant addition. The project was approved at a recent meeting of the board of directors.

The Invincible Weather Guards Co., Brooklyn, has been incorporated with a capital stock of $25,000 by L. F. Vellia, Jr., T. B. Palliser and W. H. Schaer, 2316 Bedford Avenue, to manufacture metal weatherstrips, etc.

Contract has been awarded to Louis Gold, 44 Court Street, Brooklyn, by the Battle Iron Truck Co., New York, for a five-story reinforced-concrete service and repair plant, 100 x 100 ft., on West Fifty-seventh Street, near Eleventh Avenue, to cost $250,000.

The Fahnestock Electric Co., Meadow Street, Long Island City, manufacturer of electrical specialties, has completed plans for a two-story and basement reinforced-concrete plant at East Avenue and Eighth Street.

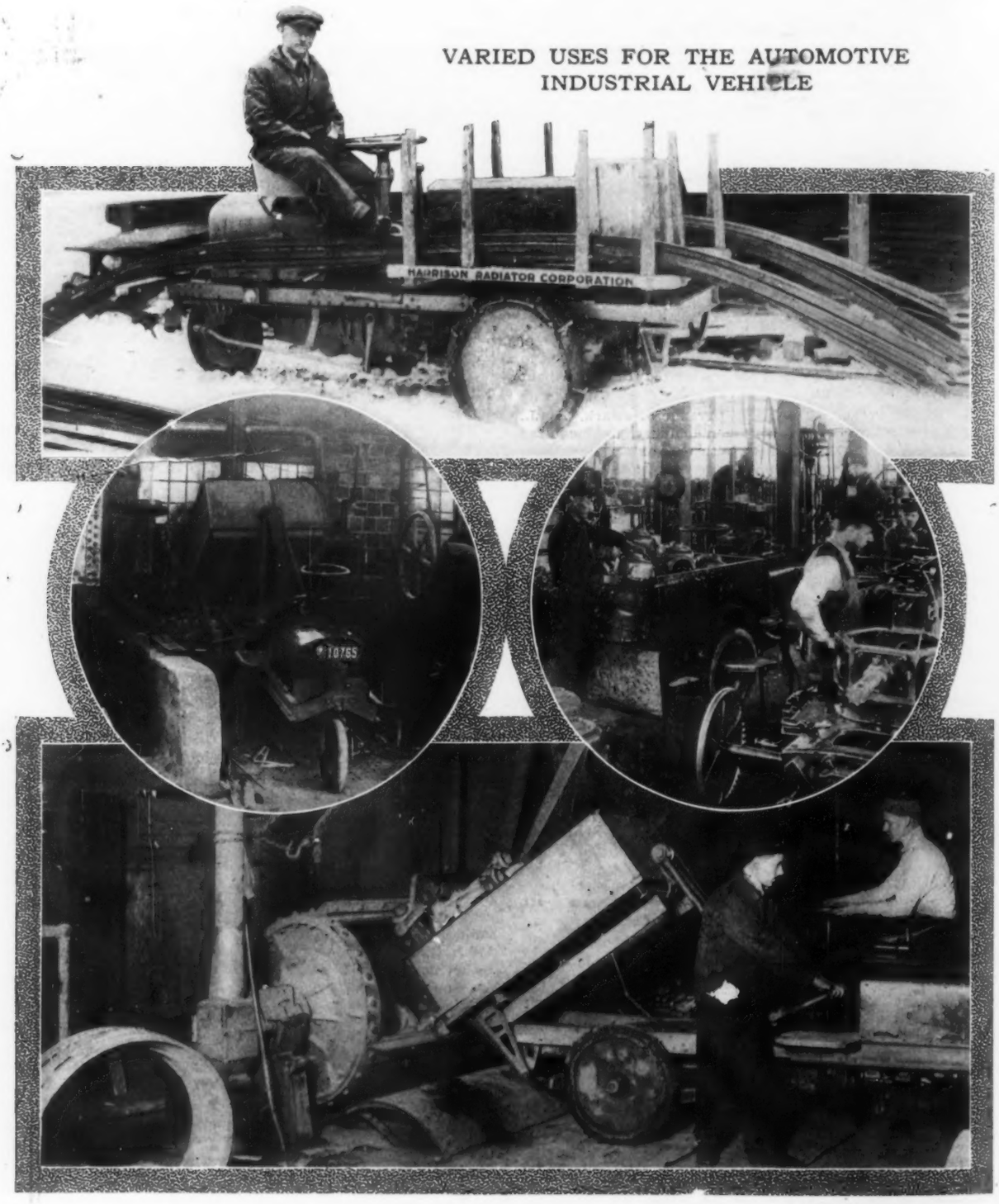
The Brook Steel Corporation, Brooklyn, has been incorporated with a capital stock of $531,000 by R. L. Wood, J. Larkin and J. Kenny, 1121 Bedford Avenue, to manufacture steel wheels for automobiles.

The Kor-doh Mfg. Co., Poughkeepsie, N. Y., has been incorporated with a capital stock of $100,000 by M. F. Purcell, F. H. Korff, E. C. Connell, to fabricate steel products.

The Nelson & Landgren Co., Brooklyn, operating an iron works at 1627 Sixty-first Street, has increased its capital stock to $30,000.

The Beebe's Island Corporation, Beebe's Island, Water-

VARIED USES FOR THE AUTOMOTIVE INDUSTRIAL VEHICLE



Miscellaneous cumbersome loads (at top) such as steel strips, lumber and castings may be loaded and carried anywhere. (At left.) Steel scrap hauled in 1¼-ton loads each, directly to scrap pile beside electric steel furnace. When not thus engaged this machine hauls coal, sand or small castings. (At right.) Automobile differential housings being unloaded within easy reach of machine operator. Machined parts are placed in piles and removed without further attention of operator. (At bottom.) Hot castings just out of molds are thrown into the tractor, which conveys to and dumps directly into the tumbler, where outer shell is removed. The machine shown, manufactured by the Clark Tructractor Co., 122 South Michigan Boulevard, Chicago, is made with a fireproof metal body

town, N. Y., is having plans prepared by J. G. White & Co., Inc., 43 Exchange Place, New York, for an electric power plant to cost about $500,000, including equipment. C. A. Starbuck of the New York Air Brake Co., 165 Broadway, New York, is president of the corporation.

The R. B. Wing & Son Corporation, Albany, N. Y., has been incorporated with a capital stock of $100,000 by E. D., M. A. and R. B. Wing to manufacture railroad equipment and supplies.

The Parallax Reflector Co., Midland Park, N. J., has been incorporated with a capital stock of $20,000 by David Hoffman, Robert D. Gray and Jacob Siegler, to manufacture reflectors, etc.

The Wickham Co. of New Jersey, Matawan, N. J., manufacturer of iron and steel castings, piano plates, etc., has broken ground for a one-story foundry addition.

The Crocker-Wheeler Co., Ampere, N. J., manufacturer of electric apparatus, has acquired property, 100 x 350 ft., at 10-44 Livingston Place, East Orange, to be used in connection with its plant.

The Ral Specialty Co., Passaic, N. J., has been incorporated with a capital stock of $25,000 by Murray Aufzien, John Riskin and Harry Lazarus to manufacture mill equipment, etc.

The Bracher Co., 280 Main Street, Belleville, N. J., manufacturer of whetstones, abrasive specialties, etc., has acquired property on Cortlandt Street, near Academy Street, for plant enlargement.

The Federal Shipbuilding Co., Lincoln Highway and Hackensack River, Kearny, N. J., has broken ground for a two-story addition, 50 x 250 ft., to cost about $40,000.

New England

BOSTON, March 29.

The machine tool market continues quiet. Some houses, however, have put through a good business and the consensus of opinion is that aggregate bookings are larger than those for the previous week and the buying movement is improving. Although the business contracted the past fortnight was of smaller proportions than in similar periods in several months, there is no weakening of prices. In fact, most people are inclined to look for higher rather than lower quotations. The most encouraging feature from the buyer's standpoint is the improved deliveries. Middle West tool builders have been able to ship many machines into New England the past seven days, most of which have come through in remarkably quick time, and many builders in this section have succeeded in disposing of a large part of accumulated tools which were the result of transportation conditions. Boston tool dealers have a number of prospective orders in hand, action on which has been lacking, but with improved deliveries it is expected that a large percentage of these orders should materialize before long.

The second-hand machine-tool market is relatively more active than the new, but purchases are mostly for single tools. The Rodney Hunt Machine Co., Orange, Mass., is in the market for a second-hand McCabe lathe with a 26-in. to 42-in. swing, taking 16 ft. to 20 ft. between centers, for log turning. The Athol Machine Co., Athol, Mass., has been disposing of second-hand tools.

The General Electric Co. is still an important factor in the market, having contracted for a large number of tools for plants acquired the past year by lease or outright purchase. No large lots have been bought by the company the past week, but the aggregate purchases have been very satisfactory. The Gilbert & Barker Mfg. Co., Springfield, Mass., has purchased additional individual tools, as has the Norton Co., Worcester, Mass., and it is believed both concerns have covered the bulk of their 1920 requirements. The United Shoe Machinery Corporation, Beverly, Mass., has bought individual tools in a limited way and probably will not be a big market factor until its labor situation is more settled. The Crane Co., Bridgeport, Conn., purchased 12 14-in. and 16-in. lathes, and a local interest whose name is withheld, 44 of the same kind of tools. The American Wringer Co., Providence, R. I., purchased a 54-in. swing, 40-ft. bed lathe, the price running into five figures.

The Boston Elevated Railway is in the market for one heavy power mortiser, which mortises to the center of material 5-in. wide, with clamp table, to drop 12 in., and the spindles to have a 5-in. stroke; one No. 1 tenoning machine; one heavy swing saw to take saws up to 48-in. diameter; one double surfacer to plane up to 30 in. wide and 8 in. thick; and one jointer and buzz planer, the head to be 16 in. wide. The Maine Central Railroad is inquiring for considerable equipment and has done some purchasing. The Boston & Maine and the Boston & Albany railroads continue to sound the market, but are buying in a very limited way. The Springfield Automatic Screw Machine Corporation, which is to build a new plant in Springfield, Mass., is reported as having under negotiation a long list of miscellaneous tools which it is expected to close within the near future.

The General Electric Co. has purchased a 30-ton crane for its Lynn plant; Stone & Webster a 5-ton crane for the Philadelphia Electric Co., and a Berlin, N. H., corporation one 30-ton crane. Local representatives have a number of cranes under negotiation, but buyers appear in no hurry to close.

The Fitchburg Grinding Co., Fitchburg, Mass., which some time ago started an addition to its plant but stopped work after the foundations were in, is now considering going ahead with the project.

Fire in the building at the corner of Atlantic Avenue and Oliver Street, Boston, recently did damage estimated at about $150,000. Some of the concerns which suffered were Joseph Beal & Co., machinery; National Co., specialty machinists; A. B. See Electric Elevator Co., and the Vedoe-Peterson Co., machinists.

The Penn Metal Co. has increased its capital stock $175,000 for the purpose of assuming the liabilities of the Penn Metal Co., Ltd., a Pennsylvania partnership association, and the Penn Metal Co., Inc., a New Jersey corporation. George A. Sagendorf is president and George Taylor treasurer. The executive offices will be in Boston. A new unit is being constructed in Cambridge, Mass.

Arrangements have been made by the Standard Oil Co. of New York to purchase land in Middletown, Conn., having a frontage on the Connecticut River, upon which a plant costing approximately $100,000 will be erected. Work on the buildings will probably start in April.

The Stephens & Williams Co., 361 Center Street, Manchester, Conn., will erect a one-story garage, 80 x 195 ft., with repair shop in the basement. The contract will be let at an early date.

William E. Bridgman, New York, has formally transferred the land on Sumner Avenue, Springfield, Mass., to the Diamond Match Co., on which the company will erect its new factory. The indicated consideration is $65,000. A large machine shop will be equipped.

Effective April 1, the executive offices of the Rolls-Royce Co. of America will be located in the company's new plant at East Springfield, Mass., instead of 145 State Street, Springfield. The production of automobile chassis is expected to start about May 1, but assembling of the cars probably will not begin until fall. The company to-day employs about 150, but it is planned to have 1000 men on the payroll by the latter part of the year.

Plans are being drawn for improvements at the plant of Cyrus Patch & Son, Inc., Quincy, Mass., coal, which include new hoisting power, boiler, etc.

The Sexton Can Co. will erect a two-story 80 x 115 ft. addition to its plant in Everett, Mass., in the next few months.

Improvements being made by the Universal Winding Co., Boston, to its Cranston, R. I., plant include a two-story foundry, 156 x 200 ft., as well as a cupola house.

Joseph Ricco, Norwalk, Conn., is having plans prepared for a one-story, 80 x 100 ft., garage and service station which will include a machine shop.

The Rockingham County Light & Power Co., Pleasant Street, Portsmouth, N. H., is planning for a two-story addition to its electric power plant to cost about $25,000.

The Bridgeport Brass Foundry, Inc., Bridgeport, Conn., has been incorporated with a capital stock of $25,000 by H. A. Rorabach, Ralph Johnston and T. C. Lynch, all of Bridgeport, to manufacture brass, bronze and other metal castings.

The Pneumatic Safety Valve Co., Woonsocket, R. I., has been incorporated with a capital stock of $100,000 by F. L. and Frederick B. Cleveland, Woonsocket, and Frederick R. Daggett, Boston, Mass., to manufacture valves and power plant equipment.

The Greist Mfg. Co., New Haven, Conn., manufacturer of sewing machine attachments, parts, etc., has increased its capital from $35,000 to $350,000.

The Draher Machine Co., Waterbury, Conn., has been incorporated with a capital stock of $25,000 by John Galat, Frank Mesaros and John Draher, 22 Chestnut Avenue, to manufacture machinery and parts.

The Liberty Mfg. Co., Elm Street, Bridgeport, Conn., manufacturer of automobile motors, is planning for the erection of a new plant to cost about $100,000, including equipment.

Landers, Frary & Clark, Commercial Street, New Britain, Conn., manufacturers of electric heating and cooking specialties, have completed plans for a one-story brick addition, 50 x 104 ft., to cost about $25,000.

The Derby Castings Co., Derby, Conn., has been incorporated with a capital stock of $25,000 by J. W. Beecher, S. C. Conlon and C. H. Stokesbury, 112 New Haven Avenue, Derby, to manufacture iron and steel castings, etc.

The O. K. Spring & Machine Co., Inc., Bridgeport, Conn., has increased its capital stock to $50,000.

The Carlisle Cord Tire Co., Stamford, Conn., manufacturer of automobile tires, has awarded a contract to the Wells Construction Co., 237 Fifth Avenue, New York, for the erection of its proposed new one-story plant, 150 x 250 ft., to cost about $100,000. J. S. Bretz is president.

The Brightwood Brass Foundry, Inc., Springfield, Mass., recently organized, will build an addition to the plant of the Rider Bagg Co., Birnie Avenue, which has been taken over for its new works. New furnace equipment and other apparatus will be installed. Isidor Satin is president.

The Holyoke Foundry Co., Holyoke, Mass., has been incorporated with a capital stock of $60,000 to acquire and operate the McHugh foundry and a machine ship. Frank J. O'Neil, Holyoke, is president. A. J. Britton, recently superintendent of the Capitol Foundry Co., Hartford, Conn., is vice-president and will be in charge of the foundry. Harry M. Lee, Bond Engineering Works, Toronto, Ont., is treasurer and manager.

Philadelphia

PHILADELPHIA, March 29.

The Iron Products Corporation, 90 West Street, New York, is reported by the Business Men's Association, Mount Union, Pa., to have purchased the grounds and buildings of an abandoned sulphuric plant there with the intention of changing it into a foundry for soil pipes and casings. The plant will need but little remodelling and this will be started within a short time.

The Schuylkill Drop Forge Co., Philadelphia, capitalized at $100,000, has been chartered by William T. McCreary and Charles E. Grothehen, Philadelphia, and James A. Dwelle, treasurer, Ventnor City, N. J.

The Sundh Engineering & Machine Co., Philadelphia, has been incorporated with a capital stock of $100,000 by W. D. Baldwin, 615 Fifth Avenue, New York; G. R. Rebmann, Sixteenth and Sansom Streets, Philadelphia, and F. C. Furlow, Ritz Carlton Apartments, New York. H. F. Winters, Jr., northwest corner of Sixteenth and Sansom streets, Philadelphia, is treasurer.

The Central Roofing Co., Philadelphia, organized to manufacture ornamental sheet metals, has been chartered with a capital stock of $5,000. James Flood, 1501 Federal Street, Philadelphia, is treasurer.

The Pennsylvania Equipment Co., Crozier Building, Philadelphia, is in the market for one 400-hp. second-hand Wickes vertical water-tube boiler, for one caterpillar traction steam shovel about 45 tons, ¾ to 1½-yd dipper, and for two 80 x 7-ft. cement kilns.

Alfred Box & Co., Inc., Front, Poplar and Canal streets, Philadelphia, is in the market for a 48-in. Gardner or Besley or similar horizontal disk grinder, also an automatic gear-cutting or hobbing machine to cut small gears. Human L. Winterer is president.

The F. J. Stokes Machine Co., Seventeenth and Cambria streets, Philadelphia, has awarded a contract to John N. Gill & Co., Otis Building, for a one-story machine shop addition, 91 x 160 ft., to cost about $50,000, including equipment.

A one-story brick and concrete power plant, 151 x 180 ft., will be erected by Sears-Roebuck & Co., Chicago, at its new works on the Roosevelt Boulevard, near Adams Street, Philadelphia, to cost about $400,000, including equipment. Contract for the building has been let to Irwin & Leighton, 126 North Twelfth Street, Philadelphia.

Arthur E. Van Bibber, Philadelphia, connected with the Congoleum Mfg. Co., Linwood, Marcus Hook, Pa., has acquired the plant of the Baltimore Roofing & Asbestos Co., Asbestos, Md., at a public sale for a consideration of $550,000. It is proposed to remodel and improve the machinery and inaugurate operations at an early date.

The International Tube Co., Philadelphia, has awarded a contract to the Philip Haibach Contracting Co., 1261 North Twenty-sixth Street, for a one and two-story plant, 70 x 80 ft., at Twenty-ninth and Dauphin streets.

The Houpert Machine Co., 257 North Twelfth Street, Philadelphia, has leased the two-story building at Twelfth and Winter streets, for its local establishment.

The Automobile Boat Co., 407 Schubert Building, Philadelphia, is having plans prepared for a new plant near Audalusia Street. Edward S. Napolis is president.

The C. R. Carver Co., Twentieth and Clearfield streets, Philadelphia, manufacturer of lead cutters, etc., has filed plans for a one-story extension, 42 x 50 ft.

The Haverford Cycle Co., 503 Market Street, Philadelphia, manufacturer of bicycles, parts, etc., has increased its capital stock from $350,000 to $500,000.

A machine shop, 32 x 100 ft., and a power plant for works service will be erected by the American Mfg. Co., Water and Morris streets, Philadelphia, at its new rope manufacturing plant on Shrunk Street, near Swanson Street, contract for which has been given to the Turner Construction Co., 242 Madison Avenue, New York. The main plant building will be two-stories, of reinforced concrete, 150 x 383 ft., with adjoining structures, 150 x 161 ft., and 100 x 100 ft. The entire plant, with machinery, is estimated to cost about $700,000.

The Carey-McFall Co., 246 North Fifth Street, Philadelphia, manufacturer of automobile lamps, etc., has acquired the three-story factory, on lot 55 x 155 ft., at 2154-58 East Dauphin Street, for its regular line of manufacture.

The Crescent Insulated Wire & Cable Co., Taylor Street, Trenton, N. J., has awarded a contract to B. Whitehead, 1430 Riverside Avenue, for a three-story addition, 50 x 150 ft., on North Olden Avenue, to cost $40,000.

The Trenton Steel & Wire Co., Ingham Avenue, Trenton, N. J., has filed plans for a one-story shop, 60 x 200 ft., to cost $21,700.

The Pennsylvania Pump & Compressor Co., Easton, Pa., recently organized with a capital stock of $500,000, is having plans prepared for a one-story foundry, 80 x 100 ft., in the Bushkill Park section, forming the first building of its proposed works. Norman A. Messinger, Drake Building Annex, is president.

A paper mill to cost over $750,000, with machinery, will be built by the Castenea Paper Co., Lock Haven, Pa. It will be two stories, 425 x 515 ft.

Fire, March 23, destroyed the plant of the Merkle Bobbin Works, Church Street, Allentown, Pa., manufacturer of bobbins and other textile machine equipment, with loss of about $10,000. It is planned to rebuild and install new machinery. Joseph Merkle is president.

The Pocono Rubber Cloth Co., Trenton, N. J., is planning for the erection of a power plant at the works of the Howard Demountable Rim Co., 1851 East State Street, recently acquired.

The Manedge Axe Co., Lewistown, Pa., has awarded a contract to M. D. Steinbach & Sons, Lewistown, for a one and two-story plant, 50 x 150 ft., to cost $80,000.

A boiler plant, 53 x 108 ft., will be erected by the Viscose Co., Marcus Hook, Pa., at its chemical works.

A number of electric light and power companies in Pennsylvania have filed notice with the Public Service Commission, Harrisburg, for permission to issue securities for proposed extensions and improvements in plants and systems. These include: Penn Central Light & Power Co., Altoona, bonds, $247,000 and $144,000; Counties Gas & Electric Co., Philadelphia, bonds, $197,000; Eastern Pennsylvania Railways Co., Pottsville, bonds, $108,000; Reading Transit & Light Co., Reading, bonds, $1,911,500; Pennsylvania Utilities Co., Easton, bonds, $87,000; Metropolitan Edison Co., Reading, bonds, $59,500; Pittsburgh & Shawmut Railroad, Kittanning, notes, $1,500,000; Citizens Traction Co., Oil City, bonds, $92,000; Chester Valley Electric Co., Coatesville, bonds, $41,000; and the Citizens Light & Power Co., Oil City, $14,000.

The Scranton Electric Co., Allentown, Pa., is considering the erection of a one-story machine and forge shop, 65 x 68 ft., at Washington Avenue and Larch Street, to cost about $30,000.

The Brown Instrument Co., maker of pyrometers, indicating and recording instruments, etc., Philadelphia, is erecting two buildings, one for the manufacture of recording thermometers, the second a research department, at a cost of $100,000. These facilities will enable it to materially increase its output of pyrometers and recording thermometers. R. P. Brown is president.

Buffalo

BUFFALO, March 29.

The M & M Drawn Steel Co., Erie, Pa,, will build a plant 200 x 300 ft. Other units will be added later. It has acquired a site on East Avenue between the New York Central and the Nickel Plate railroads. Contract for the building has been placed with the H. K. Ferguson Co., Cleveland. The company has an authorized capital stock of $500,000, and among those interested are J. Ben Offerle, W. B. Offerle, P. A. Miner and Henry L. Morse.

The Erie Motor Truck Mfg. Co., Erie, Pa., plans soon to begin the erection of a plant of 36,000 sq. ft. floor area adjacent to the New York Central and Nickel Plate railroads just south of the Erie works of the General Electric Co. The company has increased its capital stock from $100,000 to $1,000,000. L. H. Heinman is president and J. D. Harvey is vice-president and general manager.

The United States Hame Co., 135 Tonawanda Street, Buffalo, manufacturer of iron and steel hames, etc., is completing plans for a four-story reinforced concrete addition, 50 x 265 ft., at Watts and Tonawanda avenues, to cost $200,000. G. Morton Wolfe, 1377 Main Street, is the engineer.

The Lockport Radiator Co., Lockport, N. Y., has been incorporated with a capital stock of $100,000 by C. D. Nye, C. Roberts and F. M. Capell to manufacture radiators for automobiles, etc.

The Pierce-Arrow Motor Car Co., Elmwood Avenue, Buffalo, is planning for increased production in motor trucks and pleasure cars. For this purpose the expanded plant facilities arranged for Government service during the war will be utilized.

The Keystone Tool & Metal Parts Corporation, Buffalo, has been incorporated with a capital stock of $50,000 by Henry J. Kiefler, 466 Best Street; Melvin L. Meyers, 132 Loring Avenue, and Alfred C. Ueck, 851 East Ferry Street, to manufacture tools, etc.

The Strong Steel Foundry Co., 33 Norris Avenue, Buffalo, has awarded a contract to the Lackawanna Bridge Co., Bell and Abby streets, for two one-story additions, 75 x 100 ft. and 48 x 100 ft., to cost $20,000.

The Skinner Engine Works, Erie, Pa., is having plans prepared for plant improvements, including a one-story shop, 60 x 270 ft., and a one-story works power plant, 65 x 100 ft., to cost $80,000. A. D. Skinner is treasurer.

The Eastman Kodak Co., Kodak Park, Rochester, N. Y., has filed plans for two structures to include a one-story

machine shop, 150 x 362 ft., to cost $280,000 equipped, and a concrete and steel power plant to cost about $200,000 with machinery.

The Rochester Foundries, Inc., Rochester, N. Y., has been incorporated with an active capital of $52,000 by L. O. Graves, J. R. Dunn and J. M. Stuhl, to manufacture iron and steel castings.

G. Elias & Brother, 965 Elk Street, Buffalo, operating a wood-working plant, are planning for immediate establishment of a department for the manufacture of airplanes and parts for military service.

The Rome Wire Works, Rome, N. Y., has awarded a contract to the Troy Public Works Co., Utica, N. Y., for an addition to cost about $25,000.

The Binghamton Electric Truck Co., Binghamton, N. Y., has been incorporated with a capital stock of $200,000 by F. S. Matthews, H. C. Warner and W. H. Riley.

The additions to the Endicott Forging & Mfg. Co. plant, Endicott, N. Y., will consist of two two-story factories, 46 x 85 ft. and 30 x 60 ft., to cost $30,000.

The Brewer-Titchener Corporation, Binghamton, N. Y., is planning for a one-and two-story addition, 70 x 300 ft., to cost $85,000.

The R. E. Dietz Co., 221 Wilkinson Street, Syracuse, N. Y., manufacturer of metal lanterns, has awarded a contract to Dawson Brothers, Union Building, for a four-story and basement addition to cost about $50,000.

The Cooper Brass Works, Ogdensburg, N. Y., has awarded a contract to J. A. Wert, Ogdensburg, for a one-story plant to cost about $85,000.

The Union Forging Co., Union, N. Y., has awarded a contract to the Mitchell Construction Co., O'Neil Building, Binghamton, N. Y., for a one-story forge shop addition to cost $40,000.

The Syracuse Vapor Heat Mfg. Co., Syracuse, N. Y., has been incorporated with a capital stock of $40,000 by W. E. Woodcock, L. and W. D. Paddock, to manufacture heating equipment.

The Rochester Gas & Electric Corporation, Rochester, N. Y., is arranging for the installation of new boilers at its station No. 3, to be equipped with automatic stokers, for handling coal screenings, etc.

The Crescent Tool Co., 200 Harrison Street, Jamestown, N. Y., has awarded a contract to the Jamestown Construction Co. for a one-story forge shop addition, 48 x 150 ft. A power plant will also be constructed.

Baltimore

BALTIMORE, March 29.

The Monumental Machine Co., 3505 Elliott Street, Baltimore, has been incorporated with $10,000 capital stock to conduct a general machine repairing business. The incorporators are Otto P. Boettger, Louis Muthert and John W. Sims. The company has a plant and is adding additional equipment.

Wiley & Co., Inc., 7 South Gay Street, Baltimore, analytical and consulting chemist, will build a laboratory at Calvert and Read streets, Baltimore, to cost $100,000.

The Southern Electrical & Equipment Co., Charlotte, N. C., has been incorporated with $100,000 capital stock to manufacture electrical devices, etc. L. H. Hardin is general manager.

McRary & Son, Asheville, N. C., will build an addition, 60 x 80 ft., for the manufacture of truck bodies. W. S. McRary is manager.

The Royal Metal Ware Mfg. Co., Denton, N. C., will receive quotations on ring and circular shears.

The Carolina Public Service Co., Charleston, S. C., contemplates the establishment of a plant to assemble automobiles. R. H. Hemphill is manager.

Plans for a foundry and machine shop are being made by the H. E. Clark Mfg. Co., Atlanta, Ga. Quotations on equipment will be received.

The Welded Products Co., North Twenty-eighth Street, Birmingham, Ala., will build a plant for the manufacture of welded tanks, etc. Prices are wanted on cranes, hoists, etc.

The proposed plant of the Prest-O-Lite Co., Indianapolis, manufacturer of acetylene equipment, on a site recently acquired at Orangeville, Baltimore, will replace its works at Elkton, Md. It is planned to remove the equipment to the new location early in the fall. The company has also secured a site in the vicinity of Philadelphia and plans for other works there.

The Norfolk Shipbuilding & Dry Dock Co., Norfolk, Va., is planning for a number of new shop and construction buildings, including a large machine shop.

The Southern Agricultural Chemical Co., Atlanta, Ga., subsidiary of the Tennessee Copper & Chemical Co., 61 Broadway, New York, is having plans prepared for a fertilizer works. The main building will be of reinforced concrete and with equipment is estimated to cost $600,000. This will be one of 10 such plants that the company proposes to build in different parts of the South. The Pratt Engineering Co., Atlanta, is engineer.

The Washington Gas Light Co., Washington, is considering the erection of a new plant on Analostan Island, to be equipped for the production of gas from coal. The proposed plant is estimated to cost, with machinery, about $3,000,000. The company has secured a site. Under present production gas is made from oil. H. S. Reeside is president.

The Rodhill Power Co., Tarboro, N. C., recently organized, is planning for an electric power plant to cost about $125,000. B. M. Hart is head.

The Carolina Shipbuilding Corporation, Wilmington, N. C., is having plans prepared for a new pipe shop, with copper-working shop adjoining. A new drydock is also contemplated, with total capacity of about 7500 tons. The entire work is estimated to cost in excess of $750,000.

The A. G. Clarke Mfg. Co., Kirkwood, Ga., is planning the rebuilding of its foundry on North Howard Avenue, recently destroyed by fire.

The Marion Foundry & Machine Co., Tuscaloosa, Ala., is considering the erection of a new foundry for iron and steel castings.

The Farm Power Equipment Co., Birmingham, Ala., has been incorporated with a capital stock of $15,000 by M. L. McConnell, A. C. and Henry R. Howze to manufacture agricultural implements and machinery.

The Seaford Iron Works, High Street and Pearl Alley, Seaford, Del., is being dismantled. It will be removed to a new site at North Seaford.

Pittsburgh

PITTSBURGH, March 29.

The Paragon Motor Car Co., 404 Century Building, Cleveland, is completing plans for its proposed plant at Connellsville, Pa., to consist of two one-story structures, 40 x 540 ft. and 60 x 400 ft., to cost about $500,000, including equipment.

The Chamber of Commerce, McKeesport, Pa., has compiled statistics showing that the five principal iron and steel industries in the city are employing 9200 persons, with monthly payroll aggregating $1,327,000. The average monthly output is 510,500 tons of manufactured material, composed primarily of sheet steel, tin plate and steel castings.

The Pittsburgh Lamp, Brass & Glass Co., Liverpool Street and River Avenue, Pittsburgh, manufacturer of metal gas and electric fixtures, etc., has filed plans for a one-story brick addition to cost $20,000.

The Clarksburg Welding & Brazing Co., Clarksburg, W. Va., is planning for a one-story machine shop.

The Union Insulating Co., Parkersburg, W. Va., has completed plans for a new plant, 80 x 216 ft., to cost $100,000.

The car assembling works of the Kanawha Mfg. Co., Charleston, W. Va., manufacturer of mining cars, etc., were damaged by fire, March 21, with loss estimated at $25,000.

The T. & H. Specialty Co., Charleston, W. Va., recently organized to manufacture talking-machine cases, parts, etc., is arranging for the establishment of a local plant. A building providing about 30,000 sq. ft. of space has been acquired. L. A. Tinder is president, and L. W. Hamilton, secretary.

A new plant to cost about $150,000, including machinery, will be erected by the Paramount Window Glass Co., Salem, W. Va., with blowing department, 90 x 120 ft. Hubert Lambiotte is president.

In connection with its proposed plant for the manufacture of cement products, the Concrete Products & Building Co., Wheeling, W. Va., recently incorporated with a capital of $90,000, will install boiler and pumping apparatus for boiler plant, transmission equipment, electric motors etc. Theodore Smith is president.

The Somers, Fitler & Todd Co., 327 Water Street, Pittsburgh, manufacturer of machinery, has acquired property on Water Street, 160 x 162 ft., and plans for an eight-story works building to cover the entire site.

The Connellsville Electric Steel Co., Connellsville, has been incorporated with a capital stock of $105,000 by G. M. Gadsey, Pittsburgh; F. E. Markell, treasurer, and Worth Kilpatrick, Connellsville.

The Keystone Brass Foundry Co., Pittsburgh, has filed notice of a change of name to the United Bronze of Pittsburgh.

Cleveland

CLEVELAND, March 29.

Machine tool manufacturers are looking to the Orient as a promising field for export orders and an outlet that will take the place of the European market, which is virtually shut off because of the high rate of exchange. Machine-tool manufacturers regard Japan, China and India as good fields for prospective business and also Australia in a lesser degree. During the week a Cleveland manufacturer of turret lathes and screw machines booked orders for 9 machines for Japan and 9 for India.

The local machine tool market was more active the past week than during the previous two weeks. Orders, however, were almost wholly for single machines. Small manufacturers are rounding out their equipment, but some of the larger purchasers evidently are holding off. It is believed that the tightness of the money market is having an effect on buying. The Cleveland Tractor Co. placed orders for some new equipment including nine screw machines.

A Central Western manufacturer of turret lathes and screw machines has announced an advance in prices of from 3 to 5 per cent, effective April 1, and other machine tool builders are considering higher quotations. The cost of building machinery has apparently not yet reached a peak, at least in this section. Machine tool builders have been paying 9½ cents per lb. for bed castings for lathes, but foundries have advanced this price to 10½ cents and a quotation has been made as high as 19 cents by an outside foundry.

A new automotive plant will be established in Cleveland by the Freeman Motor Co., which will build four-wheel drive trucks and touring cars. A site has been acquired on the Belt Line Railroad southwest of the city. The company has temporary quarters in the Whitney Power Block, 1011 Power Avenue. M. O. Stonebreaker is president; Paul Reiff, vice-president; George H. Reiff, secretary and treasurer, and F. L. Freeman, manager.

The Regent Brass Foundry Co., Marysville, Ohio, will enlarge its plant by the erection of a new building, 50 x 75 ft., which will permit the enlargement of its polishing and buffing departments. The company will install an electric melting furnace, order for which has been placed with the Electric Furnace Co., Alliance, Ohio.

The Fostoria Pressed Steel Co., Fostoria, Ohio, will enlarge its plant by a one- and two-story extension to its main building, 86 x 100 ft.

The Bucyrus Malleable Castings Co., Bucyrus, Ohio, recently organized to build a malleable iron foundry, has abandoned its plans and will be dissolved.

The Automotive Body Co., Wauseon, Ohio, has acquired a site and will erect a plant for the manufacture of automobile bodies.

The Goodyear Tire & Rubber Co., Akron, Ohio, will establish a branch plant in Brazil for the manufacture of automobile tires for the South American trade.

The Highways Motor Co., Defiance, Ohio, has been organized with a capital stock of $1,500,000 to manufacture motors for passenger cars and trucks. It is stated that the company plans to take over two Detroit companies engaged in this line of manufacture. C. H. Kettenering, R. P. Kettenering and T. T. Shaw, Defiance; J. W. Swartz, J. W. Wright, W. R. Fruchey and A. M. Pearson, Detroit; A. R. Fraser, Cleveland, and H. S. Reynolds, Toledo, are directors.

The Canton Pattern & Mfg. Co., Canton, Ohio, recently incorporated with a capital stock of $100,000, plans to erect a pattern shop, machine shop and foundry. The business was formerly conducted as a partnership by Theodore M. Dubs and Edward R. Starkey, who have been chosen president and general manager respectively of the new organization.

The Bunting Brass & Bronze Co., Toledo, Ohio, is erecting a one-story machine shop, 80 x 120 ft.

The Toledo Metal Products Co., 1625 Dorr Street, Toledo, is adding new equipment which will treble its output. The company recently increased its capital stock from $100,000 to $200,000.

The Toledo Milling Machine Co., Toledo, Ohio, recently organized to manufacture a new line of vertical milling machines, has acquired a site on Summit Street and will build a two-story plant about 80 x 200 ft. J. A. Geismar is president; L. J. Hinde, vice-president; W. P. Bateman, secretary and treasurer, and Herman Saxon, general manager.

The Climax Motor Device Co., Cleveland, has acquired a foundry in Chagrin Falls, Ohio, which it is remodeling for factory purposes. It also contemplates the erection of an addition.

The Stratford Phonograph Co., Ashland, Ohio, has acquired a 4-acre site on which it will erect a plant.

The Euclid Broach & Machine Co., Cleveland, has been incorporated with $50,000 capital stock and will specialize in the design and production of broaching equipment. Charles S. Amadon, formerly connected with the J. N. Lapointe Co., is president, and Louis E. Peck, formerly with the same company, is treasurer.

Chicago

CHICAGO, March 29.

With one or two exceptions Chicago sellers report a revival in orders and inquiries. One dealer, in fact, expects March to be the best month so far this year, but this is not likely to be generally true, although the sales totals for the month are likely to be considerably larger than was expected a week or two ago. Although a few dealers are enjoying better deliveries from the tool manufacturers, shipments in general are getting worse. A representative dealer is receiving shipments at the rate of about one-third of the orders placed.

Most current orders are confined to one or two machines, which, however, sometimes involve considerable sums. A recent sale of a high-power vertical surface grinder alone brought $5,500. One of the largest recent orders in point of number was placed by a Wisconsin motor truck manufacturer and called for 10 18-in. x 10-ft. engine lathes. The Watson Machine Co., Sioux Falls, S. Dak., has bought about $8,000 worth of equipment, including a 24-in. x 18-ft. engine lathe, 10-in. x 42-in. universal grinding machine, 25-in. drilling machine and a milling machine. The Pullman Co. is in the market for four or five multiple spindle drilling machines, a 5-ton, three-motor traveling crane, and some other equipment. The American Manganese Steel Co., Chicago, is also inquiring for a 5-ton three-motor traveling crane.

The demand is for all classes and types of tools, but the call for punch presses is especially heavy. It is said that manufacturers of presses can do little better than four months delivery.

No new railroad lists have appeared, but it is definitely known that one or two Western lines will issue inquiries shortly.

Five carloads of shop equipment, valued at $75,000, and consisting of lathes, grinders, presses, milling machines and welding outfits were recently received by the Iowa State Agricultural College, Ames, Iowa. The machinery was bought from the Government.

The Automobile Reconstruction Co. has let contract to the Finlayson Co., 139 North Clark Street, Chicago, for the construction of a two-story machine shop, 100 x 189 ft., at 1440 West Van Buren Street, to cost $87,000.

The Vitanola Talking Machine Co. has purchased a tract 100 x 600 ft., adjoining its plant at South Fifty-second Avenue and West Nineteenth Street, Chicago, and will at once begin work on a $300,000 addition.

The International Harvester Co. will construct a one-story plant at 2600 West Thirty-first Street, Chicago, to cost $237,600.

The Albaugh-Dover Mfg. Co., 2100 Marshall Boulevard, Chicago, will receive bids through Hyde & Brown, 8 South Dearborn Street, on a one and two-story machine shop, 58 x 175 ft., to cost $35,000.

The Great Lakes Forge Co., Lytton Building, Chicago, has let contract for the construction of a one-story forge shop, 50 x 380 ft., at 1222-60 West 119th Street, to cost $100,000.

William F. Freidag, Freeport, Ill., has purchased five acres at the extreme end of Adams Street just outside the city limits and will construct a foundry and machine shop. He will organize a company, but has not yet announced what it will manufacture.

John McKenzie, La Salle, Ill., has sold his machine and repair shop to the Carus Chemical Co.

The Egyptian Iron Works, Murphysboro, Ill., will construct a pattern shop and storage house, 50 x 80 ft.

The Blackhawk Foundry & Machine Co., Davenport, Iowa, recently incorporated with $80,000 capital stock, has bought the Woodall Mfg. Co. plant at Indian Road and Clark Street. It is affiliated with the Voss Brothers Mfg. Co. and the H. F. Brammer Mfg. Co., manufacturers of washing machines.

The Davenport Machine & Foundry Co., Davenport, Iowa, will build an addition to its machine shop, 100 x 130 ft.

Foundations for the plant of the Cedar Rapids Engi-

neering Co., Cedar Rapids, Iowa, have been completed and the first unit will be ready for operation in about five weeks. The company was recently incorporated with $25,000 capital stock and will manufacture drilling machines and piston and cylinder regrinding machines. The first unit will be 40 x 60 ft.

The Warren Machine & Iron Works, Warren, Minn., will erect a two-story addition, 70 x 70 ft.

Chalmers & Williams, 72 West Adams Street, Chicago, manufacturers of elevator buckets, mine cages, etc., are having plans prepared for a one-story foundry at Chicago Heights for the production of iron and steel castings, to cost about $300,000 with equipment.

The Keystone Driller Co., Twelfth and Illinois streets, Joplin, Mo., has completed plans for a one-story addition, 125 x 140 ft., to cost about $100,000. It specializes in the manufacture of well-drilling machinery, pumps, etc., with headquarters at Beaver Falls, Pa.

The Whiting Foundry Equipment Co., 140 South Dearborn Street, Chicago, has awarded a contract to Wells Brothers & Co., 53 West Jackson Boulevard, for the erection of a four-story and basement addition, 56 x 95 ft., to its plant at Harvey, Ill., to cost about $200,000.

The Duluth Crushed Stone Co., Alworth Building, Duluth, Minn., is planning for the erection of an addition to its Gary stone-crushing plant, to cost about $300,000, including machinery. C. D. Brenner is president.

The Berger Mfg. Co., Tenth Avenue, South, Minneapolis, Minn., manufacturer of sheet metal building products, has completed plans for a one-story addition to its plant on Ulysses Street, 80 x 110 ft., to cost about $60,000. Headquarters are at Canton, Ohio.

The Union Drop Forge Co., 1746 Kostner Avenue, Chicago, will build a one-story addition, 64 x 165 ft., to cost about $25,000.

Detroit

DETROIT, March 29.

The Congress Tool & Die Co., 7 East Fort Street, Detroit, is having plans prepared for a one-story and basement building, 55 x 115 ft., to cost about $20,000. It will be equipped as a machine shop.

The Blodgett Engineering & Tool Co., Kerr Building, Detroit, is having plans prepared for a four-story, reinforced-concrete and steel plant at Dalzelle and Fourteenth streets. A. E. Harley, 435 Woodward Avenue, is the architect.

The Continental Motors Corporation, Jefferson Avenue, Detroit, manufacturer of automobile motors, has arranged for a note issue of $5,000,000. The company has an output of about 200,000 motors a year at the present time. R. W. Judson is president.

The Dort Motor Car Co., South and Mason streets, Flint, Mich., is completing plans for the erection of two three-story machine shops, 98 x 336 ft., on Western Road. The structures with equipment are estimated to cost about $1,000,000.

The Michigan Light & Consumers Power Co., West Main Street, Jackson, Mich., is planning for the erection of a two-story electric power plant. With new steel tower transmission line to be constructed to Battle Creek, the work is estimated to cost about $400,000.

The King Motor Car Co., Jefferson Avenue, Detroit, has acquired a site in the western part of the city for the erection of a new plant. Plans are now being prepared. Artemus Ward, Jr., is president.

The Clayton Lambert Auto Parts Co., 1380 Beaubien Street, Detroit, has awarded a contract to the Wisconsin Bridge & Iron Works, Penobscot Building, for the erection of a new plant on the line of the Detroit Terminal Railroad, to cost about $400,000. Herbert Owen is manager.

The Wilder-Strong Implement Co., Monroe, will immediately erect a foundry and make alterations to its present plant at a total cost of $15,000.

The Kales Stamping Co., Detroit, is preparing for the erection of a Canadian factory, probably in Walkerville, although the exact location has not yet been determined.

The Gier Pressed Steel Co., recently merged with the new Motor Wheel Corporation, incorporated for $11,000,000, will establish an additional plant with approximately 20,000 sq. ft. of floor space, as soon as the merger plans are complete.

The Apex Motor Corporation, Ypsilanti, manufacturer of the Ace car, broke ground the past week for its main plant, 80 x 500 ft. The production schedule calls for 2000 cars the first year.

The Saranac Automatic Machine Co., St. Joseph, Mich., is constructing the first unit of a plant on West Main Street. It will be two stories, 50 x 100 ft. The company will manufacture wire-bound box machines, and paper box and carton machines.

The Peck Iron & Steel Co., Kalamazoo, Mich., has increased its capital stock from $30,000 to $60,000 and within 60 days will remove to Vicksburg, where it will occupy the former plant of the Vicksburg Governor Co., a structure with 14,000 sq. ft. of floor space.

Milwaukee

MILWAUKEE, March 29.

March bookings by local machine tool manufacturers aggregate somewhat in excess of February, although part of the increase may be attributed to the greater number of days. Inquiry continues active and new business is being placed in good volume, although orders generally are for single tools or small lots. Makers of milling machines report increasing interest from railroad supply shops. Iron and steel foundries are swamped with orders and in many instances unable to accept much new business because of their sold-up condition, which is accentuated by a steadily growing labor shortage. New construction continues to shrink, due to high costs, but in general existing projects are being carried to completion.

The Ladish Drop Forge Co., Cudahy, has increased its authorized capital stock from $300,000 to $700,000 to finance additional business and provide for further extension of the shops and additional equipment. Frank A. Ladish is secretary-treasurer and general manager.

The Federal Rubber Co. of Illinois, with main works and general offices at Cudahy, will erect a six-story brick and steel factory addition, 200 ft. sq., estimated to cost $275,000.

The Claus Automatic Gas Cock Co., 1614 Booth Street, Milwaukee, has increased its capital stock from $25,000 to $50,000 and will enlarge its facilities for manufacturing gas cocks and brass castings. Emil L. Claus is president.

The Kissel Motor Car Co., Hartford, Wis., has engaged Cahill & Douglas, consulting engineers, 217 West Water Street, Milwaukee, to prepare estimates of improvements contemplated in its steam generating plant.

The Marathon Electric Mfg. Co., Wausau, Wis., has increased its capital stock from $75,000 to $250,000. It plans extensions and the installation of some new machinery for making small motors and motor-driven utilities.

The Burlington Brass Works, Burlington, Wis., will build a one-story brick and concrete foundry and machine shop addition, 100 x 140 ft., plans for which are being completed by Edmund B. Funston, architect, Racine, Wis. Further details are not yet available. C. Roy McCanna is president.

The Continental Axle Co., Edgerton, Wis., has awarded contracts for the erection of a one-story brick and concrete machine and assembling shop addition, 58 x 200 ft., costing $30,000 without equipment. It is making purchases of equipment from time to time. J. W. Menhall is president.

The American Safety Signal Co. is establishing a factory at Saukville, Wis., for manufacturing automotive equipment and accessories.

The Great Lakes Coal & Dock Co., affiliated with the Valley Camp Coal Co., has purchased a site, 400 x 900 ft., on the North Menominee Canal at Twentieth Street, Milwaukee, for a new dock with a storage capacity of 275,000 to 300,000 tons. Contracts have been awarded to the Mead-Morrison Co. for an electrically operated man-trolley bridge crane handling a 10-ton grab bucket, and having a screening plant built into the leg of the crane. O. S. McFarland is district manager in charge of the new Milwaukee dock and has offices at 822 First Wisconsin Building.

The P. B. Yates Machine Co., Beloit, Wis., manufacturer of wood-working machinery and tools, has let contracts for the construction of a brick and steel gray iron foundry addition, 100 x 206 ft. With cupolas and other equipment the investment will be about $150,000.

E. J. Brandau, LaCrosse, Wis., has leased the building at 106 East Main Street at Sparta, Wis., and is equipping a general machine shop for lathe and stamping work, repairs, etc. He also will manufacture a patented steam and vapor attachment for explosive engines on a commercial scale.

The Star Milking Machine Co., Wausau, Wis., a $1,000,000 corporation organized several months ago to manufacture patented aluminum and copper milking machines and other automatic farm devices, has decided to locate its permanent works at Lomira, Wis. An existing building is being equipped for machine work and assembling and materials for 5000 machines are being purchased.

The Board of Education, Sheboygan, Wis., has accepted plans prepared by Childs & Smith, architects, 64 East Van

Buren Street, Chicago, for the proposed new Sheboygan high school and manual training institute, to cost about $750,000 and be ready Sept. 1, 1921. Bids probably will be taken late in April.

The Oshkosh Motor Truck Co., Oshkosh, Wis., has engaged Auler & Jensen, local architects, to design its new manufacturing plant, 80 x 310 ft., of brick and steel, with sawtooth roof, and an office building, 40 x 64 ft., two stories. The cost is estimated at $150,000. Equipment of the present factory will be supplemented with considerable new machinery. B. A. Mosling is secretary.

The Specialty Brass Co., Pleasant Prairie, Kenosha County, Wis., has increased its capital stock from $25,000 to $75,000. It intends to enlarge its plant during the spring and summer.

The Meehan Mfg. Co., Milwaukee, has been incorporated with a capital stock of $25,000 to manufacture patented acetylene welding and cutting apparatus and similar specialties. The incorporators are Henry Barnes, W. Lewein and William M. Meehan, 752 Fifty-fifth Street.

The Neenah Brass Works, Neenah, Wis., has reorganized its board of directors following the retirement of George J. Mayer. The new officers are: President, Henry Horkman; vice-president, David Horkman; secretary-treasurer, Iva Horkman; manager, Emory Horkman.

The National Gauge & Equipment Co., LaCrosse, Wis., expects to occupy about April 15 a one-story sawtooth machine shop and factory addition, 135 x 253 ft., providing about 30,000 sq ft. Additional machine tools, including automatic screw machines, are being purchased.

The E. & W. Mfg. Co., 319-325 Oregon Street, Milwaukee, manufacturer of attachments for converting passenger cars into commercial vehicle chassis, is installing additional equipment for manufacturing trailers. George H. Williams is president and treasurer.

The Splitex Radiator & Mfg. Co., Racine, Wis., which recently increased its capital stock from $50,000 to $150,000, is contemplating the transfer of its operation to Baraboo, Wis. The plan provides for the erection of a new factory and purchase of additional equipment for manufacturing automobile, truck and tractor radiators and coiling systems. A. C. Bowman is secretary.

The Nash Motors Co., Kenosha, Wis., is erecting a boiler room addition, 50 x 50 ft., and enlarging the heat treating shop by an addition, 40 x 140 ft.

The Tomah Electric Co., Tomah, Wis., has accepted the bid of Charles Larson, local contractor, to erect a one-story brick, steel and concrete steam generating plant, 54 x 64 ft., costing about $40,000. Louis W. Barnes is secretary.

Indianapolis

INDIANAPOLIS, March 29.

The Imperial Drop Forge Co., 510 South Harding Street, Indianapolis, has completed plans for the erection of a one-story brick and steel addition.

The Eagle Foundry Co., Muncie, Ind., has awarded a contract to H. B. Jarvey, 116 North Liberty Street, for the erection of a one-story foundry addition, 150 x 200 ft., at Tenth and Liberty streets. H. D. Hartley is president.

The Anderson Foundry & Machine Works, 215 Jackson Street, Anderson, Ind., is taking bids for a one-story foundry addition, brick and steel, 130 x 220 ft., to cost about $75,000. W. W. Durkin is president.

The Liquid Carbonic Co., Heidelback Avenue, Evansville, Ind., manufacturer of soda fountain equipment, has had plans prepared for a two-story addition, 80 x 150 ft., to cost about $50,000.

The Oliver Chilled Plow Works, Chapin Street, South Bend, Ind., is having plans prepared for two additions to be used in connection with the manufacture of farm tractors. The main building will be 120 x 1200 ft., for general production, while a one-story structure, 156 x 200 ft., will be equipped as a forge shop. The extensions are estimated to cost $200,000. F. C. Cunningham is general superintendent.

The Wabash Valley Electric Co., Clinton, Ind., is completing plans for a new electric light and power plant. The Hoosier Engineering Co., Indianapolis, is engineer. J. W. Robb is president.

The One Piece Bi-Focal Lens Co., 426 North Capitol Avenue, Indianapolis, is having plans prepared for an eight-story and basement reinforced-concrete plant, 65 x 195 ft., to cost aobut $300,000. John Rau is president.

The Riddel Worm-Drive Switch Stand Co., Indianapolis, has been incorporated with $50,000 capital stock. The directors are Shorrod Riddel, Frank Heath and James J. Graham.

The Graham Valve Co., Mount Vernon, Ind., has been incorporated with $250,000 capital stock to manufacture plumbing supplies. The directors are Charles Pearson, Willard C. Christmas and Louis Wasem.

The American Die Casting Co., 212 West McCarty Street, Indianapolis, has been purchased by T. A. Lavelle, T. J. Jones and A. D. Hoover for $250,000, who also own the Indianapolis Brass Works, 1012 East Michigan Street. Mr. Lavelle is president of the Federal Pattern Works, Indianapolis, and is interested in the Lavelle Foundry Co., Anderson, Ind. The casting plant will be doubled and the name changed to the American Bearing & Die Castings Corporation, the capital stock being increased from $100,000 to $750,000. The company makes a specialty of bronze-backed babbitt-lined bearings.

The Gary Auto Body Mfg. Co., Gary, Ind., has been incorporated with $250,000 capital stock to manufacture automobile bodies. The directors are Franklin T. Fetterer, Walter M. Staley and William B. Levey.

Terre Haute, Ind., capitalists have become interested in the Block Tire & Rubber Co., heretofore operated in a small way at Lafayette, Ind., and have bought 140 acres one-half mile from Terre Haute on which a plant will be erected, the first building to be 80 x 280 ft. George R. Wilson is president and treasurer; L. C. Zebring, Shelburn, Ind., is vice-president, and E. N. Ely, Terre Haute, secretary. The capital stock will be $1,500,000.

The Auto Specialty Mfg. Co., Lapel, Ind., has been incorporated with $25,000 capital stock to manufacture automotive accessories. The directors are Claude Hinshaw, Harry B. Castor and O. E. McClintock.

The Duffin-Simmons Co., Elkhart, Ind., has been organized and incorporated with $100,000 capital stock to manufacture a multiple hitch for gang plows and other implements.

The Haynes Stellite Co., Kokomo, Ind., has increased its capital stock from $50,000 to $750,000.

The Drake Mfg. Co., Indianapolis, has been incorporated with $100,000 capital stock to manufacture automobile equipment. The directors are O. M. Drake, Alfred E. Drake and James B. Stone.

The Lafayette Products Co., Lafayette, Ind., has been incorporated with $25,000 capital stock to manufacture mechanical devices. The directors are Clinton Anderson, Bert Harrington and C. A. Crieger.

The New Albany Machine Mfg. Co., New Albany, Ind., has bought the factory property it has had under lease for five years. Henry H. Martin, Louisville, Ky., is president of the company.

The Keytsone Foundry Co., Plymouth, Ind., has awarded contracts for additions which will double the capacity of its plant.

The Kaws Tractor Mfg. Co., Indianapolis, has increased its capital stock from $75,000 to $125,000.

The Hoosier Automotive Co. has been incorporated at Evansville, Ind., with $25,000 capital stock to manufacture automobile accessories. The directors are Edward F. Schnacke, William Oehlmann and Ross A. Thomas.

The Decatur Castings Co., Decatur, Ind., is remodeling the old Alfo building and will construct a cupola building adjacent to it. It will make castings for the General Electric Co.

The Singer Mfg. Co. plant, South Bend, Ind., has been purchased by the South Bend Lathe Co. and the H. D. Lee Mercantile Co. The property includes nine and one-half acres and five factory buildings.

St. Louis

ST. LOUIS, March 29.

The Okmulgee Brick Co., Okmulgee, Okla., has increased its capital stock from $80,000 to $400,000 and will install machinery for two new units at Gaither, Okla.

The Istrouma Foundry & Machine Co., Baton Rouge, La., James A. Durand, secretary-treasurer, is reported in the market for about $10,000 worth of machinery.

The Western Tinware Co., St. Louis, has leased a building which it will equip for the manufacture of electric washing machines.

The Universal Machine & Tool Co., Bigheart, Okla., has increased its capital stock by $50,000 to add to its mechanical equipment.

The O. K. Welding & Machine Co., Henryetta, Okla., capital $75,000, will erect a machine shop and a foundry. C. W. Fisher, McAlester, Okla., is the architect.

The Wichita Threshing Machine Co., Roosevelt, Okla., will equip a plant for the manufacture of threshing machines.

The Associated Producing & Refining Co., Shreveport, La., Malcolm Burns, Commercial National Bank Building, president, will equip a 10,000 bbl. pumping station.

The Thomason & Lewis Lumber Co., Princeton, La., capital stock $50,000, will equip planing and saw mills.

The Hannibal Rubber Co., Hannibal, Mo., will erect a building to cost $100,000 and install about $150,000 worth of machinery.

The Louisiana Motor Car Co., Cedar Grove, La., will install equipment for an automobile body plant and also a sheet metal plant.

W. S. King, Earle, Ark., is in the market for low-pressure boiler equipment.

The Wood & Lane Co., St. Louis, is in the market for two 600-hp. water tube boilers for delivery in Oklahoma.

Cincinnati

CINCINNATI, March 29.

While some machine-tool manufacturers report business running behind the volume of January and February, the majority, while admitting a falling off the early part of the month, state that in the past two weeks there has been a very noticeable increase in orders and that March will average up well with the months immediately preceding. Some good-sized orders were placed in this city and surrounding districts, and a couple of lists are still before the trade, one from the General Motors Corporation, which is purchasing equipment for a number of its plants, and another from the Cadillac Motors for its new plant at Detroit. The American Car & Foundry Co. is also inquiring for a number of machines. The Ford Motor Co. placed orders the past week for a number of planing machines for its various plants, one to be shipped to Manchester, England. The General Motors Corporation has purchased equipment for subsidiaries in Dayton and Detroit. A local manufacturing concern, which is establishing a branch in Texas, is also understood to have bought complete equipment for its machine shop from local houses.

The American Can Co. has purchased property on Spring Grove Avenue, Cincinnati, and it is understood that plans will shortly be announced for the construction of a plant. The property has a frontage of 404 ft. on Spring Grove Avenue and 340 ft. on Fergus Street. It is said that the purchase price was about $60,000.

Contracts for the erection of the addition to the Ahrens-Fox Fire Engine Co.'s plant on Alfred Street, Cincinnati, have been let to the Grimm Iron Works Co. Construction will commence immediately.

The Edna Brass Mfg. Co., Reading Road, Cincinnati, through the Reliance Engineering Co., is asking for bids on the construction of a new foundry, 50 x 100 ft. and 25 ft. high. The company also contemplates further improvements as soon as the new foundry is completed.

The addition to the plant of the Sebastian Lathe Co., Covington, Ky., will be completed this week and machinery will be installed to get the plant ready for operation as soon as possible. The building is 70 x 150 ft., one story.

The Highways Motor Co., Defiance, Ohio, has been incorporated with a capitalization of $1,000,000 to manufacture auto trucks and pleasure cars. C. H. Kettering, Defiance, is president.

The Seller Motor Car Co., Covington, Ky., has awarded contract to John J. Craig for the construction of a garage, 125 x 190 ft., two stories, on Madison Avenue between Thirteenth and Fourteenth streets.

The Master Electric Co., 460 Bacon Street, Dayton, Ohio, has been incorporated with a capitalization of $50,000 to manufacture pumps and other motor-driven machinery and will commence operations within 30 days. The incorporators are R. G. Corwin, John H. Larsh, E. P. Larsh, S. A. Brown and A. C. Jackson.

The Dayton Industrial Service Co., Dayton, has been incorporated with a capital stock of $27,500 by Col. H. C. K. Muhlenburg and B. J. Johnson. It will conduct a complete research laboratory for testing building materials.

The Arnold Tool Mfg. Co., Dayton, has been incorporated with a capital stock of $20,000 by J. T. Arnold and T. Lowry.

The plant of the Pomeroy Machine Co., Pomeroy, Ohio, was damaged by fire to the extent of $100,000 last week. The machine shop, foundry and pattern shops suffered the greatest loss. A duplicate power plant, recently equipped, was untouched and it is expected that the company will be able to resume operations within a month.

The Hance Mfg. Co., Westerville, Ohio, has been incorporated with a capitalization of $100,000. The company now operates a foundry and the purpose of the incorporation is to secure necessary capital for the extension of the business, plans for which call for the erection of a new factory. H. T. Hance is president.

Gustave Wiedeke & Co., 1837 Richard Street, Dayton, manufacturers of boiler expanders and similar equipment, have awarded contract to the H. R. Blogg Construction Co., 1226 East Third Street, for a three-story addition, 80 x 84 ft., to cost about $65,000.

The Monitor Stove & Range Co., North Gest Street, Cincinnati, has awarded contract to the Austin Co., Euclid Avenue, Cleveland, for the erection of an addition to cost about $1,000,000, including machinery.

The John H. McGowan Pump Co., Fourth National Bank Building, Cincinnati, is planning for the erection of a one-story foundry on Oakley Avenue, to be equipped for a daily capacity of about 20 tons of iron castings. B. L. Baldwin, Second National Bank Building, is architect.

The Lake Erie Steel & Wire Co., Bedford, Ohio, has had plans prepared for a one-story addition to cost about $40,000. John Palmer is president and general manager.

The Mount Vernon Foundry & Machine Co., Mount Vernon, Ohio, is planning for the purchase of a number of machine tools and other machine shop equipment.

The Central South

LOUISVILLE, March 29.

Articles of incorporation have been filed by the John Isert Co., Louisville, to manufacture sheet metal goods. The capital stock is $20,000 and the incorporators are John H. Isert, Truman Cook, and others.

The Kentucky Switch & Signal Co., Louisville, with a capital stock of $16,000, has been incorporated to manufacture appliances for electric and steam railroads. The incorporators are R. V. and Lucy Cheatham, St. Matthews; W. E. Scoggan, Sanford, Fla., and R. R. Scoggan, Jeffersonville.

The Louisville Pattern Works, Louisville, has changed its name to the Louisville Pattern & Engineering Corporation.

The Dow Wire & Iron Works, Louisville, has increased its capital stock from $100,000 to $500,000, to care for plant improvements and enlarged production. W. Hume Logan, W. R. Duncan and A. T. Horrell are directors.

The Shannon Bed Spring Co., Louisville, Ky., recently organized, has plans under way for the erection of a one-story plant, 65 x 200 ft., with extension, 58 x 70 ft., to be equipped for the manufacture of steel bed springs. Woodford Shannon is manager. V. P. Collins, Louisville, is the architect.

The Hagan Producing & Refining Co., Mansfield, La., is considering the erection of a new oil refinery to cost about $1,000,000, including machinery.

The William J. Oliver Mfg. Co., Knoxville, Tenn., manufacturer of tractors, etc., is planning for enlargements in its plant and will install new machinery to cost about $40,000.

The Great Southern Producing & Refining Co., 1007 Hume-Mansur Street, Indianapolis, Ind., is considering plans for the erection of a new oil refinery near Shreveport, La., with capacity of about 1500 bbl., to cost $250,000. R. N. Miller is general manager.

The Scientific Steel Wool Co., Springfield, Ohio, is considering the establishment of a new plant at Owensboro, Ky., with annual capacity of about 2,000,000 lb. of material.

The Aluminum Co. of America, Pittsburgh, has completed plans for the erection of a new aluminum plate works near Mascott, Tenn.

Texas

AUSTIN, March 29.

The Two-Cord Retread Mold Co., 206 Anchor Building, Fort Worth, Tex., recently organized with a capital stock of $200,000, is arranging for the erection of a plant for the manufacture of cord tires. The first unit will be 40 x 100 ft., and will be supplemented by three other units of approximately the same size. A foundry and machine shop will be equipped. T. B. Yarbrough is treasurer.

The Shamrock Lock Co., Shamrock, Tex., has been incorporated under Delaware laws with a capital stock of $100,000 by George T. Morris, Amarillo, Tex.; M. Reynolds, Shamrock; and James A. Jones, Oklahoma City, Okla., to manufacture locks and locking devices.

The Lufkin Foundry & Machine Co., Lufkin, Tex., is planning for the erection of three additions, to include two

one-story machine shops, each 50 x 120 ft., and foundry of the same size. It recently increased its capital stock from $150,000 to $200,000. W. C. Trout is general manager.

The White Oil Corporation, 501 Fifth Avenue, New York, is planning for the erection of a new refinery in the vicinity of Texas City, where it has a site aggregating about 800 acres. The proposed plant will have a capacity of 15,000 bbl. and is estimated to cost in excess of $1,000,000, including equipment.

The Denison Oil & Refinery Co., Denison, Tex., is planning for the erection of a new refinery with a daily capacity of about 2000 bbl.

The Texas Battery Co., Dallas, Tex., has been incorporated with a capital of $20,000 by E. R., H. B. and R. L. Tennant, to manufacture electric batteries.

The Marine Iron Works, Galveston, has been incorporated with a capital stock of $100,000. The incorporators are S. A. Duggan, J. Waltmley and H. Gray.

The Seymour Producing & Refining Co., Seymour, has awarded the contract for the construction of a 3000-bbl. refinery to the Refinery Construction Co., Fort Worth.

The Newcastle Light, Power & Ice Co., Newcastle, has been incorporated with a capital stock of $50,000 to construct an electric light and power plant and ice factory. The incorporators are W. F. Nance, W. S. Husted and J. H. Arnold.

The Lufkin Rock Co., Lufkin, will install machinery in its plant at that place. It has a capital stock of $12,000 and was recently incorporated by W. M. Glenn, E. L. Kurth and L. M. Mitchell.

The Craven Oil & Refining Co., Jakehamon, Tex., recently organized, has awarded contract to the Refinery Construction Co., Fort Worth, for the erection of a new refinery with a daily capacity of 3000 bbl. The plant is estimated to cost $250,000. J. M. Craven is president.

Canada

TORONTO, March 29.

The extensive orders from Canadian railroads which have recently been placed for rolling stock and other equipment are expected to greatly increase the demand for machinery and machine tools. Several railroads are making large expenditures putting their plants in shape and installing additional equipment. Provincial and municipal governments are also coming into the market. Steel plants, foundries and manufacturing concerns generally are improving their plants and installing more up-to-date equipment, which will give greater production and cut costs and operating handicaps. While orders from these quarters are chiefly for single tools or machines, they cover such a wide range that dealers are kept busy meeting the demands. The greater number of inquiries are for new equipment, but when a buyer needs a machine in a hurry he will take a used machine and in this way dealers are disposing of a large number of second-hand tools, for which there would otherwise be little demand.

Eugene Bogart, Paterson, N. J., has completed plans for the erection of a plant in East London, Ont., to manufacture structural steel devices. A site will be secured and construction will start in the near future.

The Carriage Factories, Ltd., is planning to increase the output of the Orillia, Ont., plant. As a result of the sale of the Heney Carriage factory buildings in Montreal, recently, the truck bodies and winter automobile tops formerly manufactured in Montreal will be turned out at the Orillia plant. Part of the Fisher Body works will be equipped for this purpose.

The Alloy Steel Works, Ltd., 400 Front Street, East, Toronto, is in the market for a No. 9 Bliss press or similar style, about 3-in. stroke.

Bids will be called at an early date for the erection of an electric light plant for Moosomin, Sask., to cost $40,000. George S. Page is clerk. Murphy & Underwood, Saskatoon, Sask., are consulting engineers.

The Empire Motors, Ltd., Toronto, has been incorporated with a capital stock of $250,000 by William A. J. Case, 801 Dominion Bank Building; James B. Taylor, 78 Belhaven Road; George E. Atwood and others to manufacture automobiles, airplanes, motor cycles, etc.

The H. V. Short Hardware, Ltd., Toronto, Ont., has been incorporated with a capital stock of $40,000 by Hedley V. Short, 46 Adelaide Street West, Frank H. Wilmot, Frank M. Short and others to manufacture hardware, plumbers' and machinists' supplies, etc.

The Francoeur Engine & Thresher, Ltd., Camrose, Alta., has been incorporated with a capital stock of $200,000 by Joseph L. Francoeur, Fernand Francoeur and others to manufacture castings, machinery, tractors, etc.

The Volta Mfg. Co., Ltd., Welland, Ont., has been incorporated with a capital stock of $200,000 by Robert T. Turnbull, John Young, John W. Simpson, all of Welland; Charles W. Sims of St. Catharines, and others to acquire and take over the plant and business of the Volta Mfg. Co., manufacturer of electrical machinery, tools, equipment, iron, steel and other metals, etc.

Coal Economy, Ltd., Montreal, has been incorporated with a capital stock of $200,000 by Arthur W. P. Buchanan, Louis deG. Prevost and others to manufacture radiators, boilers, etc.

The Canadian Laco Lamps Ltd., Toronto, has been incorporated with a capital stock of $500,000 by James S. Lovell, 25 King Street West; William Bain, 189 College Street; Ernest H. Stewart and others to manufacture lamps, lighting appliances, machinery, etc.

John T. Hepburn, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Henri G. Smith, room 44, 2 Toronto Street, John F. Boland, 1391 Bloor Street West; Charles H. Bowyer and others to manufacture machinery, cranes, engines, etc.

The Canadian Pacific Railway, Montreal, will install new equipment, including a welding plant at London, Ont., to cost $7,000. Mr. Williams, London, Ont., is the superintendent.

The Dennis Wire & Iron Works Co., 22 Dundas Street West, London, Ont., will start work at once on the erection of an addition to cost $9,000. E. R. Dennis is manager.

The Columbia Handle Co., Adelaide Street, London, Ont., will rebuild its factory, recently damaged by fire. Prices are asked on new equipment. W. H. Bradden is manager.

The Sensitive Tire & Rubber Co. has purchased an existing building at Sherbrooke, Que., which it will remodel for a manufactory. Frank B. Law, 19 Dundas Street East, Toronto, is a director of the company.

The Steel Co. of Canada, Hamilton, Ont., is in the market for alligator shears, capacity, 7½ x 7½ mild cold steel.

The Enterprise Foundry Co., Ltd., Sackville, N. B., has been incorporated with a capital stock of $400,000 by William S. Fisher, Robert B. Emerson, both of St. John, N. B.; Frederick A. Fisher, Sackville, N. B., and others to manufacture boilers, machinery, heating appliances, etc.

The Repeatograph Co. of Canada, Ltd., Montreal, has been incorporated with a capital stock of $10,000 by John J. Meagher, James E. Coulin, Henri Crepeau and others to manufacture phonographs, repeating machines, machinery, etc.

The Sherbrooke Iron Works, Ltd., Sherbrooke, Que., has been incorporated with a capital stock of $100,000 by John P. Wells, Charles D. White, Walter H. Lynch and others to manufacture machinery, castings, implements, etc.

The Independent Steel Specialties Corporation, Ltd., Montreal, has been incorporated with a capital stock of $250,000 by William L. Davies, Alastair A. Gowan, Frank P. Turville and others to manufacture iron and steel, castings, tools, implements, etc.

The Page-Hersey Export Co., Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Leo. W. Goetz, John Sutherland, Helen M. McTague and others, all of Guelph, Ont., to manufacture machinery, wire, boilers, implements, etc.

Adam Clark, Ltd., Hamilton, Ont., has been incorporated with a capital stock of $250,000 by William J. Clark, Alfred T. Harvey, William F. Buckingham and others to manufacture furnaces, radiators, pumping apparatus, boilers, etc.

The British Canadian Machine & Tool Co., Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Thomas L. May, 427 Queen Street West; John G. Baukat, 21 Sussex Avenue; Harry A. Newman, 59 Victoria Street and others to manufacture motors, machinery, etc.

The Hubbell Mfg. Co., Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Mary G. Hubbell, George P. McHugh, Room 207, Manning Chambers, 72 Queen Street West; Carl M. Herlick, 2 Maughan Crescent and others to manufacture electric heating and lighting apparatus, etc.

The Ericson Marine & Aircraft, Ltd., Toronto, has been incorporated with a capital stock of $250,000 by Frank J. Hughes, Room 307, 72 Queen Street West; Leo J. Phelan, 19 Nanton Avenue; Charles P. McTague and others to manufacture engines, airplanes, machinery, etc.

Wilson-McGovern, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Henry H. Davis, 10 Adelaide Street East; Lawrence A. Landriau, Barrett R. Davidson and others to manufacture machinery, supplies, tools, etc.

The Allied Metals Selling Co., Ltd., Deschene, Que., has been incorporated with a capital stock of $150,000 by Ernest H. Stewart, 25 King Street West; Harold C. Walker, Gordon H. Munnoch and others, all of Toronto, to manufacture iron and steel products, etc.

His Master's Voice, Ltd., Montreal, has been incorporated with a capital stock of $1,500,000 by William Bain, 189 College Street; Ernest H. Stewart, 25 King Street West; Robert Gowans and others, all of Toronto; to manufacture sound reproducing machines, talking machines, musical instruments, motors, etc.

The Port Arthur Sheet Metal Mfg. Co., Ltd., Port Arthur, Ont., has been incorporated with a capital stock of $40,000 by Arthur Whiddon, John K. Kennett, David B. Turville and others.

California

LOS ANGELES, March 23.

The Edwin Forrest Forge Co., Oakland, is planning for the installation of additional electric equipment at its plant, with aggregate installation to total about 250 hp.

The National Carbon Co., Eighth and Brannan streets, San Francisco, has awarded contract to Hannah Brothers, 142 Sansome Street, for the erection of a one and four-story and basement reinforced-concrete addition to its plant, 175 x 275 ft., to cost about $362,000.

The Republic Brass & Mfg. Co., Los Angeles, has been incorporated with a capital stock of $25,000 by L. A. Swenson and P. H. Cary to manufacture brass, bronze and other metal specialties.

The Western Aluminum Mfg. Co., Emeryville, Cal., is having plans prepared for the erection of a one and one-half story plant to cost about $45,000. H. B. Knowles is vice-president and general manager. Karl Koller, 207 Federal Syndicate Building, Oakland, Cal. is the engineer.

The Dunning Iron & Electric Co., 467-75 East Third Street, Los Angeles, has been organized to manufacture electrical specialties and other metal products. Charles W. Dunning, 3841 Trinity Street, heads the company.

The Hanford Iron Works, San Bernardino, Cal., is having plans prepared for a one-story addition, 70 x 75 ft., to cost about $60,000 including equipment. The installation will include an electric furnace and 5-ton electric traveling crane.

The See-Dro Separator Co., West Berkeley, has plans under way for enlargements in its plant at Gilman and Second streets. New electric equipment will be installed to provide for a total load of about 1000 hp. H. R. Sander is treasurer.

The Pioneer Motor Co., 307 Golden Gate Avenue, San Francisco, has completed plans for a four-story service building and repair works, 120 x 220 ft., on McAllister Street, near Van Ness Avenue, to cost about $200,000.

The Scheau Foundry Co., Upland, Cal., has arranged for the immediate enlargement of the shop of the Upland Foundry & Machine Co., recently acquired, to provide for the manufacture of an orchard heater, invented by W. C. Scheau, head of the company. The Whiting-Mead Commercial Co. is also interested in the concern.

The Union Construction Co., Oakland, has taken a contract for the construction of four coast guard vessels for the Government, to be built at its local shipyard. The vessels will be 240 ft. over all and will be equipped with engines of electric-driven type. The contract aggregates $3,100,000.

The Pacific Northwest

SEATTLE, March 23.

The ship repair industry is rapidly becoming one of the most important in this district. Seattle has become the home port of many trans-Pacific lines and the matter of prompt repair work is of extreme importance. Manufacturers' representatives report a good demand for their product, the only difficulty being a shortage of supply. Great scarcity is reported in motors of all lines and deliveries are extremely slow and uncertain.

Negotiations are under way by the United States Shipping Board for the sale of the Skinner & Eddy steel shipyard No. 2 to David Rodgers, formerly general manager of the plant. Mr. Rodgers holds contracts for twenty-five steam vessels which will cost more than $40,000,000.

Ira Hinckley, 701 Lee Street, Seattle, plans the erection of a new paper box factory at 1255 Westlake Avenue to cost $45,000. It will be two stories, 120 x 120 ft., equipped with new machinery throughout.

The plant of the Oregon Chair Co., Portland, Ore., has been purchased by Heywood Brothers & Wakefield Co., Gardner, Mass., for $200,000. The plant will be enlarged and several new lines of manufacture added.

The American Firebrick Co., Mica, Wash., is to be enlarged to double its present capacity. Charles R. Oudin is president.

The United States Sheet Metal Co., Boise, Idaho, will erect a new plant to cost $75,000.

George Loeb, Brownsville, Ore., plans the construction of a shingle mill, box factory and planing mill. A site has been secured.

The port of Portland, Ore., will call for bids shortly for construction and equipment of a floating five-pontoon drydock of 15,000 tons capacity. G. B. Hegardt, chief engineer of the commission.

The Bellingham Marine Railway & Boat Building Co., Bellingham, Wash., has been incorporated and will establish a plant for building and equipping small boats and for repair work.

The $850,000 floating drydock of the Skinner & Eddy Corporation, Seattle, has been purchased by the Moore Shipbuilding Co., Oakland, and will be towed to that city.

J. W. Turner, Spokane, Wash., heads a concern which plans the erection of a cold storage plant with an initial capacity of 800 cars.

The lumber plant of the Boardman Lumber Co., Boardman, Ore., was destroyed by fire recently with a loss of $20,000. It will probably be rebuilt.

OFFICE CHANGES

Arthur M. Watkins, machine-tool dealer, has removed his offices from 26 Cortlandt Street, New York, to room 1107, City Investing Building, 165 Broadway.

General offices of the Newton Steel Co., which is building a 10-mill sheet plant at Newton Falls, Trumbull County, will be established in Youngstown. The company plans to start two of its mills April 1.

G. H. Morgenstern, commercial and industrial engineer, has opened offices in the People's Savings Bank Building, Holyoke, Mass. He will direct the manufacture and distribution of the Nofalt Motor Products Co. products. The products have been manufactured in Stoneham, Mass., by a specialty company, which has been bought by Holyoke interests. The products include pockets for automobile side curtains, anti-rattlers, automatic lubricating cups, power tire pumps, and fuel-feed systems.

The Polk-Genung-Polk Co., Ft. Branch, Ind., manufacturer of steel forms for circular reinforced concrete structures, will open an office at 521 Occidental Building, Indianapolis. W. C. Polk is president of the company; G. C. Kendle, vice-president, and Homer T. Genung, secretary-treasurer. The main office is in Chicago.

The Thomas Spacing Machine Co., Pittsburgh, has opened an Eastern office in Room 57, Transportation Building, Philadelphia. G. L. Bohannon is in charge and will handle the company's entire line of equipment, including spacing tables, multiple punches, standard line of punches and shears, angle bending rolls, angle planers, angle bevelers, open back inclinable presses and a complete line of small tools. Mr. Bohannon was formerly chief engineer and assistant general manager of the Youngstown Steel Car Co., Youngstown, Ohio.

The Morse Chain Co., Ithaca, N. Y., has opened two new sales offices, at Baltimore and Philadelphia. The Baltimore office, 15 Lexington Building, is in charge of E. R. Morse and the Philadelphia office, 302 Harrison Building, is in charge of M. H. Rodda.

The American Metallurgical Corporation, Franklin Trust Building, Philadelphia, has opened an office at Crediand Chambers, 111 Queen Street, Sheffield, England, the title of the headquarters there to be the Midland Metallurgical, Ltd. The foreign headquarters will be under the direction of Beecroft & Partners, an old and well known engineering organization of Staffordshire, England. G. C. Castle will be directly in charge. The foreign headquarters will cover the entire field of electro-metallurgy and chemical developments.

The Dayton-Dowd Co., manufacturer of centifugal pumps, Quincy, Ill., has opened a branch office in Cleveland under the management of L. E. Maher, Maher Engineering Co., Chicago. This office will handle Dayton-Down centrifugal pumps in addition to other mechanical equipments.

Frank C. Brand, for a number of years manager of A. G. Butler, Inc., 253 Broadway, New York, has severed his connection with the company to establish his own business of pattern making and foundry supplies. Associated with Mr. Brand is Gustav Weiss. The new company is known as the F. C. Brand Co., 27 Warren Street, New York.

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general headings of "Iron and Steel Markets" and "Metal Markets."

Iron and Soft Steel Bars and Shapes

	Per lb.
Bars:	
Refined iron, base price	4.75c.
Swedish bars, base price	20.00c.
Soft Steel	
¾ to 1⅞ in., round and square	3.52c. to 4.75c.
1 to 6 in. x ⅜ to 1 in.	3.52c. to 4.75c.
1 to 6 in. x ¼ to 5/16	3.62c. to 4.85c.
Rods—⅝ and 11/16	3.57c. to 4.55c.
Bands—1½ to 6 by 3/16 to No. 8	4.22c. to 5.75c.
Hoops	5.57c. to 5.75c.
Shapes:	
Beams and channels—3 to 15 in.	3.47c. to 4.75c.
Angles:	
3 in. x ¼ in. and larger	3.47c. to 4.75c.
3 in. x 3/16 in. and ⅛ in.	3.72c. to 5.10c.
1½ to 2½ in. x ⅛ in.	3.52c. to 4.90c.
1½ to 2¾ in. x 3/16 in. and thicker	3.47c. to 4.85c.
1 to 1¼ in. x 3/16 in.	3.52c. to 4.90c.
1 to 1¼ x ⅛ in.	3.57c. to 4.95c.
⅞ x ⅞ x ⅛ in.	3.62c. to 5.00c.
¾ x ⅛ in.	3.67c. to 5.05c.
⅝ x ⅛ in.	4.07c. to 5.85c.
½ x 3/32 in.	5.17c. to 6.55c.
Tees:	
1 x ⅛ in.	3.87c. to 5.25c.
1¼ in. x 1¼ x 3/16 in.	3.77c. to 5.15c.
1½ to 2½ x 3/16 in. and thicker	3.57c. to 4.95c.
3 in and larger	3.52c. to 4.80c.

Merchant Steel

	Per lb.
Tire, 1½ x ½ in. and larger	4.75c.
Toe calk, ½ x ⅜ in. and larger	5.50c.
Cold-rolled strip (soft and quarter hard)	12c. to 14c.
Open-hearth spring steel	7.00c.
Shafting and Screw Stock:	
Rounds	6.00c. to 7.00c.
Squares, flats and hex	6.50c. to 7.50c.
Standard cast steel, base price	15.00c.
Best cast steel	20.00c. to 24.00c.
Extra best cast steel	25.00c. to 30.00c.

Tank Plates—Steel

	Per lb.
¼ in. and heavier	3.67c. to 5.00c.

Sheets

Blue Annealed

	Per lb.
No. 10	5.07c. to 7.50c.
No. 12	5.12c. to 7.55c.
No. 14	6.62c. to 7.60c.
No. 16	6.72c. to 7.70c.

Box Annealed—Black

	Soft Steel C. R., One Pass, per lb.	Wood's Refined, per lb.
Nos. 18 to 20	7.80c. to 8.80c.	—
Nos. 22 and 24	7.85c. to 8.85c.	9.80c.
No. 26	7.90c. to 8.90c.	9.85c.
No. 28	8.00c. to 9.00c.	10.00c.
No. 30	8.10c. to 9.10c.	—

No. 28, 36 in. wide, 10c. higher.

Galvanized

	Per lb.
No. 14	8.25c. to 10.00c.
No. 16	8.50c. to 10.25c.
Nos. 18 and 20	8.65c. to 10.40c.
Nos. 22 and 24	8.80c. to 10.55c.
No. 26	8.95c. to 10.70c.
No. 27	9.10c. to 10.85c.
No. 28	9.25c. to 11.00c.
No. 30	9.75c. to 11.50c.

No. 28, 36 in. wide, 20c. higher.

Pipe

Standard—Steel	Blk.	Galv.	*Wrought Iron*	Blk.	Galv.
⅛ in. Butt...	—36	—19	¾-1½ in. Butt	—18	+2
¼-3 in. Butt.	—40	—24	2 in. Lap	— 9	+9
3½-6 in. Lap.	—35	—20	2½-6 in. Lap..	—11	+6
7-12 in. Lap..	—25	— 8	7-12 in. Lap...	+ 2	+20

Steel Wire

Base Price* on No. 9 Gage and Coarser	Per lb.
Bright basic	8.00c.
Annealed soft	8.00c.
Galvanized annealed	8.50c.
Coppered basic	8.50c.
Tinned soft Bessemer	10.00c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

Base Price	
High Brass Sheet	28¼c. to 29½c.
High Brass Wire	28¼c. to 29½c.
Brass Rod	26¾c. to 29 c.
Brass Tube	42½c. to 44½c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 29½c. per lb. base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14x20		
			Primes	Wasters
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	80 lb...	10.80	10.55
		90 lb...	10.90	10.65
		100 lb...	11.00	10.75
1C...$15.00	$13.00	IC...	11.25	11.00
1X... 17.25	15.00	IX...	12.25	12.00
1XX... 19.00	16.75	IXX...	13.25	13.00
1XXX... 20.75	18.50	IXXX...	14.25	14.00
IXXXX... 22.25	20.25	IXXXX...	15.25	15.00

Terne Plates

8-lb. Coating 14x20

100 lb.	$9.35
IC	9.50
IX	10.50
Fire door stock	12.75

Tin

Straits pig	65c.
Bar	70c. to 80c.

Copper

Lake ingot	21c. to 22c.
Electrolytic	20c. to 21c.
Casting	19½c. to 20c.

Spelter and Sheet Zinc

Western spelter	10¼c. to 11¼c.
Sheet zinc, No. 9 base, casks	14c. open 14½c.

Lead and Solder*

American pig lead	10¼c. to 11¼c.
Bar lead	11¼c. to 11¾c.
Solder ½ and ½ guaranteed	43c.
No. 1 solder	40c.
Refined solder	36c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	90c.
Commercial grade, per lb.	50c.

Antimony

Asiatic	12¼c. to 12¾c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb. 35c. to 38c.

Old Metals

The market has been firmer, showing a tendency to higher prices. Dealers' buying prices are as follows:

	Cents Per lb.
Copper, heavy and crucible	16.75
Copper, heavy and wire	16.00
Copper, light and bottoms	14.50
Brass, heavy	16.75
Brass, light	8.00
Heavy machine composition	16.00
No. 1 yellow brass turnings	9.75
No. 1 red brass or composition turning	12.75
Lead, heavy	8.00
Lead, tea	6.00
Zinc	5.50

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